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NAS WHITING FIELD
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TECHNICAL MEMORANDUM NUMBER 4 REMEDIAL INVESTIGATION AND FEASIBILITY
STUDY PHASE IIA HYDROGEOLOGIC ASSESSMENT NAS WHITING FIELD FL
1/1/1995
ABB ENVIRONMENTAL



This document Remedial Investigation and Feasibility Study, Phase IIA Technical Memorandum No. 4 Hydrogeologic Assessment, Naval Air Station Whiting Field Milton, Florida has been prepared under the direction of a Florida Registered Professional Geologist. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

PHASE IIA

TECHNICAL MEMORANDUM NO. 4 HYDROGEOLOGIC ASSESSMENT

**NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA**

Unit Identification Code (UIC): N60508

Contract No. N62467-89-D-0317

Prepared by:

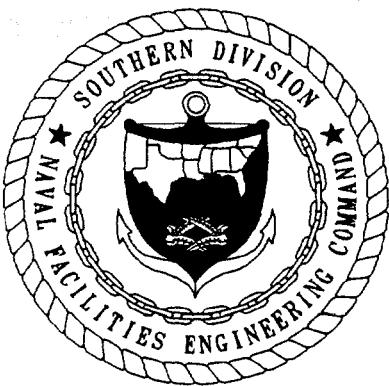
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FOREWORD

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), and as directed in Executive Order 12580 of January 1987, the Department of Defense (DOD) conducts an Installation Restoration (IR) program for evaluating and remediating problems related to releases and disposal of toxic and hazardous materials at DOD facilities.

The IR program consists of Preliminary Assessment and Site Inspection, Remedial Investigation and Feasibility Study (RI/FS), and Remedial Design and Remedial Action at sites where chemicals were possibly disposed. The Preliminary Assessment and Site Inspection identify the presence of pollutants. The RI/FS analyzes the nature and extent of contamination and determines the optimum remedial solution. The Remedial Design and Remedial Action complete the implementation of the solution.

Previous investigations prepared for the Naval Energy and Environmental Support Activity and Southern Division, Naval Facilities Engineering Command (SOUTHNAV-FACENGCOM) have determined that Naval Air Station (NAS) Whiting Field has 23 waste sites that may pose a threat to human health or the environment. Consequently, an RI/FS is being conducted under the Navy IR program to address the extent, magnitude, and impact of possible contamination at these waste sites.

This Technical Memorandum discusses field methods, transmits data, and summarizes results for the hydrogeologic assessment phase of the RI.

Questions regarding this report should be addressed to the Commanding Officer, NAS Whiting Field, or to SOUTHNAVFACENGCOM, Code 1859, at AUTOVON 563-0341 or (803) 743-0341.

EXECUTIVE SUMMARY

A Remedial Investigation and Feasibility Study (RI/FS) is being conducted at the Naval Air Station (NAS) Whiting Field facility in Milton, Florida, by the Department of Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) as part of their Installation Restoration (IR) program. The IR program was designed to identify and abate or control contaminant migration resulting from past operations at naval installations.

Technical Memorandum No. 4, Hydrogeologic Assessment, is one in a series of seven technical memoranda that summarizes the results and transmits the data gathered during the RI. These memoranda will form the supporting basis for the RI report and any additional work to be completed at the facility.

The purpose of the RI Hydrogeologic Assessment was to characterize site-specific and facility-wide hydrogeology at NAS Whiting Field. Data obtained from this assessment may be used in support of the Feasibility Study and any remedial actions to be performed later at the facility.

The field work for the Hydrogeologic Assessment was conducted between September 1993 and February 1994 and included installing 77 monitoring wells, collecting water level measurements at facility monitoring wells during two events, and conducting aquifer testing at 40 monitoring wells.

The findings of the hydrogeologic assessment at NAS Whiting Field indicated the following.

- Hydrogeologic conditions at the facility are consistent with regional hydrologic descriptions of the sand-and-gravel aquifer.
- Groundwater flow is primarily to the south and southwest. However, an additional flow component to the southeast is present through the eastern part of the installation.
- Hydraulic conductivity values, seepage velocity values, and vertical gradient values varied widely across the installation. Installation-wide comparisons of the data did not indicate a consistent pattern of variation. The data are indicative of a heterogeneous aquifer.
- Vertical groundwater flow is primarily in the downward direction; however, local upward flow was observed and reversals of flow were documented between groundwater measurement events.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
ASTM	American Society for Testing and Materials
AVGAS	aviation gasoline
BTEX	benzene, toluene, ethylbenzene, and xylene
bls	below land surface
CAR	Contamination Assessment Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
ft/day	foot per day
ft ² /day	square feet per day
ft/ft	foot per foot
FGS	Florida Geological Survey
HRS	Hazard Ranking System
IAS	Initial Assessment Study
ID	inside diameter
IR	Installation Restoration
K	hydraulic conductivity
msl	mean sea level
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPL	National Priority List
NWFWM	Northwest Florida Water Management District
OD	outside diameter
OLF	Outlying Landing Field
OVA	organic vapor analyzer
PA	Preliminary Assessment
PCBs	polychlorinated biphenyls
PVC	polyvinyl chloride
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SOP	Standard Operating Procedure

GLOSSARY (Continued)

SOPQAM USEPA Standard Operating Procedures and Quality Assurance Manual
SOUTHNAV-
FACENGCOM Southern Division, Naval Facilities Engineering Command

TAL target analyte list
TCE trichloroethene
TCL target compound list
TRAWING FIVE Training Air Wing Five

USCS Unified Soil Classification System
USEPA U.S. Environmental Protection Agency
UST underground storage tank

v_s seepage velocities

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to the Department of Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGC) is submitting Technical Memorandum No. 4 for the Phase IIA Remedial Investigation and Feasibility Study (RI/FS) for Naval Air Station (NAS) Whiting Field located in Milton, Florida. The RI/FS is being conducted under contract No. N62467-89-D-0317.

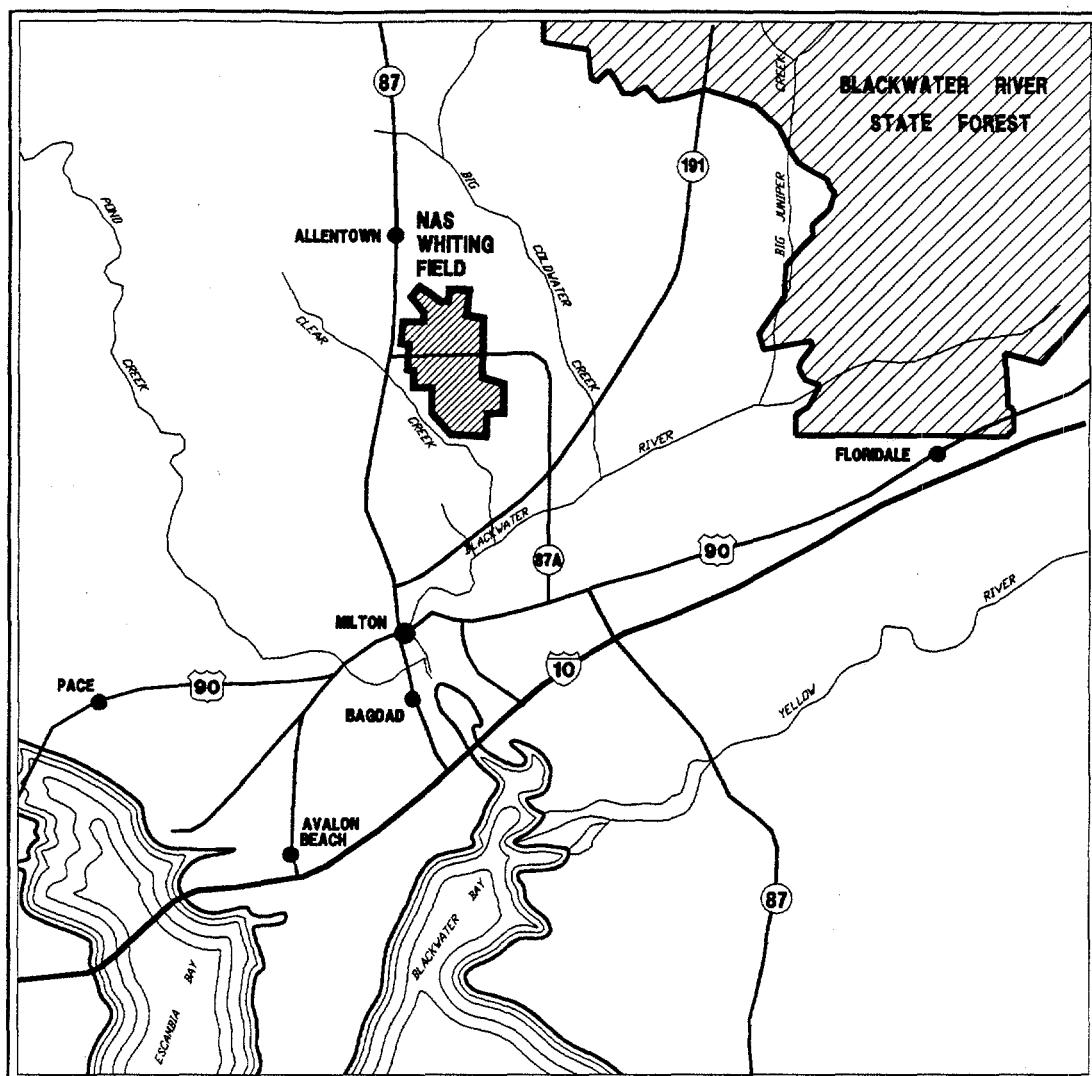
Technical Memorandum No. 4, Hydrogeologic Assessment, is one in a series of seven technical memoranda that summarizes the results and transmits data gathered during the Phase IIA Remedial Investigation (RI). These technical memoranda form the supporting basis for the RI report and any additional work to be completed at NAS Whiting Field. The Phase IIA RI field program was conducted between April 1992 and February 1994. The following is a complete list of Phase IIA technical memoranda:

- No. 1, Surface Water and Sediment Assessment;
- No. 2, Geologic Assessment;
- No. 3, Soils Assessment;
- No. 4, Hydrogeologic Assessment;
- No. 5, Groundwater Assessment;
- No. 6, Overall Phase IIA RI Assessment; and
- No. 7, Workplan and Recommendations for Phase IIB RI

Installation Location and Description. NAS Whiting Field is located in Santa Rosa County, which is in Florida's northwest coastal area, approximately 7 miles north of Milton and 20 miles northeast of Pensacola (Figure 1-1). NAS Whiting Field presently consists of two air fields separated by an industrial area. The installation is approximately 2,560 acres in size. Figure 1-2 presents the installation layout and location of sites at NAS Whiting Field.

NAS Whiting Field, home of Training Air Wing Five (TRAWING FIVE), was constructed in the early 1940's. Subordinate commands currently stationed at NAS Whiting Field include training squadrons VT-2, VT-3, VT-6, HT-8, and HT-18 (SOUTHNAVFACENGC, 1988). It was commissioned as the Naval Auxiliary Air Station Whiting Field in July 1943 and has served as a naval aviation training facility ever since its commissioning. The field's mission has been to train student naval aviators in the use of basic instruments, formation and tactic phases of fixed-wing, propeller-driven aircraft, and basic and advanced helicopter training.

1.1 PURPOSE OF THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS). The purpose of the RI is to collect data and characterize the site to assess the threat(s) to human health and the environment and the FS serves to identify a range of remedial alternatives to address any identified risk. To achieve this objective, an RI has been conducted to assess the nature and distribution of chemicals associated with a number of sites at the installation. The data collected during the RI field program will be used in the FS to screen, evaluate, and select remedial alternatives to provide permanent, feasible solutions to environmental contamination problems at NAS Whiting Field.



0 2.5 5 MILES
SCALE: 1" = 5 MILES

MAP LOCATION

Source: ABB Environmental Services Inc. 1992

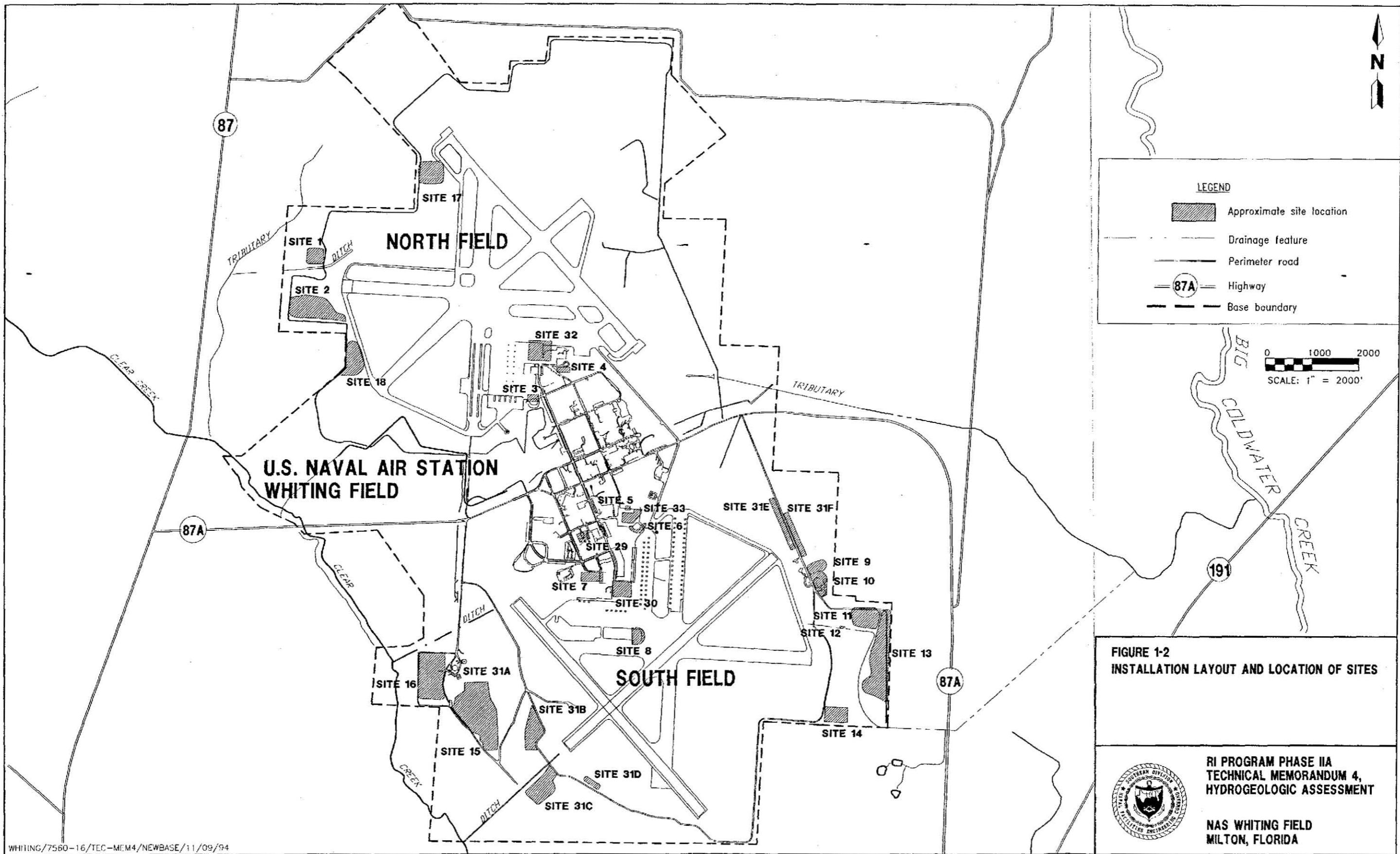
**FIGURE 1-1
FACILITY LOCATION MAP**

H:\WHITING\7560-16\TEC-MEM4\FIG1-1



**RI PROGRAM PHASE IIA
TECHNICAL MEMORANDUM 4,
HYDROGEOLOGIC ASSESSMENT**

**NAS WHITING FIELD
MILTON, FLORIDA**



The Navy Installation Restoration (IR) program was designed to identify and abate or control contaminant migration resulting from past operations at naval installations. The IR program is the Navy response authority under Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and Executive Order 12580. CERCLA requires that Federal facilities comply with the act, both procedurally and substantively. SOUTHNAV-FACENGCOM is the agency responsible for the Navy IR program in the southeastern United States. Therefore, SOUTHNAV-FACENGCOM has the responsibility to process NAS Whiting Field through Preliminary Assessment (PA), Site Investigation (SI), priority listing, RI/FS, and remedial response selection in compliance with the guidelines of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300).

Section 105(a)(8)(A) of SARA required the U.S. Environmental Protection Agency (USEPA) to develop criteria to set priorities for remedial action based on relative risk to public health and the environment. To meet this requirement, USEPA has established the Hazard Ranking System (HRS) as Appendix A to the NCP. First promulgated in 1982, the HRS was amended in December 1990, effective March 14, 1991 (55 Federal Register No. 241:51532-51667), to comply with requirements of Section 105(c)(1) of SARA to increase the accuracy of the assessment of relative risk.

The HRS score for NAS Whiting Field was generated in 1993. The score was sufficient to place NAS Whiting Field on the National Priority List (NPL). In January 1994, the USEPA placed NAS Whiting Field on a proposed list of sites to be included on the NPL (40 CFR 300, Federal Register, 18 January 1994), and on May 31, 1994, NAS Whiting Field was placed on the NPL effective June 30, 1994 (40 CFR 300, Federal Register, May 31, 1994). As a result, the RI/FS for NAS Whiting Field must follow the requirements of the NCP, as amended by SARA, and guidance for conducting RI/FS under CERCLA (USEPA, 1988).

1.2 PREVIOUS FACILITY INVESTIGATIONS. Numerous investigations have been conducted at NAS Whiting Field prior to the implementation of the Phase IIA RI/FS (Table 1-1). These investigations include an Initial Assessment Study (IAS), Verification Study, and a Phase I RI completed in response to CERCLA requirements. In addition to these investigations, two other investigations have been completed at NAS Whiting Field. One investigation, which focused on the Battery Acid Seepage Pit (Site 5), was initiated under a Consent Order with the Florida Department of Environmental Regulation (FDER; FDER has since been redesignated as the Florida Department of Environmental Protection [FDEP]). A second investigation has been completed under the Navy's underground storage tank (UST) program on three petroleum sites. These previous investigations are briefly summarized in the following sections.

Initial Assessment Study, 1985. Historical records reviewed during the IAS (Envirodyne Engineers, 1985) indicated that throughout the years of operation, NAS Whiting Field has generated a variety of wastes related to pilot training, the operation and maintenance of aircraft and ground support equipment, and the facility maintenance programs. Figure 1-2 provides a map showing the location of all sites that have been identified for investigation at NAS Whiting Field.

Interviews with facility personnel and record reviews indicated that prior to the establishment of hazardous waste management programs and programs to recycle waste oil during the 1970's most of the hazardous wastes were reportedly disposed onsite. Waste materials were disposed either in dumpsters that were emptied into onsite disposal areas or they went into waste oil bowsers, which probably were used for crash crew training. Enviroyne Engineers (1985) estimated that thousands of gallons of wastes including waste paints, paint thinners, solvents, waste oils, waste gasoline, hydraulic fluids, aviation gasoline (AVGAS), tank bottom sludges, polychlorinated biphenyl (PCB) transformer fluids, and paint stripping wastewater were potentially dumped into onsite disposal areas. These disposal areas consisted of natural or man-made depressions located within the confines of the air station. In addition to the waste materials routinely disposed onsite in the disposal areas, additional materials were reportedly released onsite as the result of accidents or equipment failure.

Based on a review of historical data, aerial photographs, field inspections, and interviews with facility personnel, 16 potentially contaminated disposal or spill sites and/or sources for contaminant migration were initially identified at NAS Whiting Field by the IAS team (Enviroyne Engineers, 1985).

The IAS report (Enviroyne Engineers, 1985) concluded that 15 of the 16 sites warranted further investigation, under the Navy's IR program, to assess potential long-term impacts. Only one site, Site 2, the Northwest Open Disposal Area, was determined to not warrant further consideration.

To evaluate the 15 sites requiring further investigation, a Confirmation Study, including sampling and monitoring of the sites, was recommended in the IAS to confirm the presence or absence of suspected contamination and to further quantify the extent of any problems that might exist.

Confirmation Study, 1985-1986. The Confirmation Study consisted of two parts: verification and characterization. In November 1985, Geraghty & Miller, Inc., prepared for the Navy a plan of action for the Verification Study entitled *Naval Assessment and Control of Installation Pollutants, Verification Study, NAS Whiting Field* (Geraghty & Miller, 1985a), which was subsequently submitted to the FDER. This plan outlined the details of the proposed scope of work for the Verification Study. In December 1985 during discussions with FDER, two additional sites (Sites 17 and 18) were added to the Verification Study. Both sites, in use in 1985, were locations where waste fuels and solvents were burned in crash crew training exercises.

The results of the Verification Study (*Verification Study, Assessment of Potential Ground-Water Pollution at Naval Air Station Whiting Field, Florida*, Geraghty & Miller, 1986) provided an assessment of the physical and chemical conditions currently existing at NAS Whiting Field. Groundwater contamination was confirmed at some sites and not at others. The conclusions of the study indicated that a Characterization Study was needed to further characterize the nature and extent of contamination at some sites.

The three-phase (IAS, Confirmation Study, and Remedial Measures) IR program was modified in 1987-88 to be congruent with CERCLA and SARA regulatory requirements. The updated nomenclature included:

- PA and SI,

- RI,
- FS, and
- planning and implementation of Remedial Design.

Under the updated rules, the IAS became equivalent to a PA and the first part of the Confirmation Study (the Verification Study) functioned as the SI. Subsequently, the Characterization Study was not performed and the existing investigations were used to support the updated program.

Battery Shop Site Investigation, 1985. During 1985 one of the sites (Site 5, Battery Acid Seepage Pit) was investigated separately under a Consent Order with the FDER. Results indicated no significant contamination had resulted from past activities at the Battery Acid Shop, and it was recommended that the Consent Order be rescinded on April 15, 1987. Data from this investigation were compiled in a report entitled *Detection and Monitoring Program, Battery Shop Site, Final Report, NAS Whiting Field, Florida* (Geraghty & Miller, 1985b) and submitted to FDER.

Phase I Remedial Investigation, 1990-1992. In December 1990, ABB-ES, under contract to the Department of the Navy, SOUTHNAVFACENGCOM, initiated a Phase I RI at NAS Whiting Field. The objective of the Phase I RI was to characterize the nature and extent of contamination at sites identified during the IAS. The Phase I RI program addressed 14 of the 18 previously identified sites at the installation (Table 1-1). Limited investigations were conducted at Sites 2 and 12 during the Phase I RI because no contaminants had been detected during the Verification Study.

No contamination attributable to Sites 2 and 12 was detected during the Phase I RI and No Further Action (NFA) was proposed for both sites. Site 2, the Northwest Open Disposal Area, only received construction and demolition debris and was initially judged in the IAS to warrant no further consideration. However, at a Project Managers' meeting in Atlanta, Georgia, on November 13, 1992, USEPA and FDER requested that additional investigations be conducted at Sites 2 and 12 before NFA would be accepted. Subsequently, Sites 2 and 12 were included for further study within the IR program.

Five additional sites were identified during the Phase I RI and subsequently added to the Phase IIA RI program for investigation. The site numbers and names are as follows:

Site 29, Auto Hobby Shop;
Site 30, South Field Maintenance Hangar;
Site 31, Sludge Drying Beds and Disposal Areas;
Site 32, North Field Maintenance Hangar; and
Site 33, Midfield Maintenance Hangar.

Site numbers 19 through 28 are not used at NAS Whiting Field because they identify sites located at Outlying Landing Field (OLF) Barin in Foley, Alabama. A separate remedial investigation is being conducted at the OLF Barin sites. Both the USEPA and the Alabama Department of Environmental Management are lead Remedial Project Managers.

Site 5 was not included in the Phase I RI. However, the presence of benzene in samples from the existing monitoring wells surrounding the seepage pit at Site 5 warranted further consideration within the investigation of Site 33.

Table 1-2 summarizes the historical information collected on the identified sites at NAS Whiting Field.

The Phase I hydrogeologic field program included two rounds of water level elevation measurements; single-hole, *in-situ*, permeability tests (slug tests) at 15 monitoring wells; and a pumping test conducted at the south production well, W-3 (adjacent to Site 5). The first round of water level elevation measurements was conducted at the 16 monitoring wells installed during the Verification Study (Geraghty & Miller, 1985a). The second round included additional wells at Sites 5 and 8 that were installed during Phase I. Based on an evaluation of the hydrogeologic data collected during the Phase I RI at NAS Whiting Field (ABB-ES, 1992), the following conclusions have been developed.

Groundwater Flow Directions. The groundwater flow direction of the sand-and-gravel aquifer at NAS Whiting Field appears to be to the south-southwest (toward Clear Creek) in the western half of installation and to the southeast (toward Big Coldwater Creek) in the eastern half.

Groundwater flow directions were calculated for six site groupings that were delineated based on their relative proximity to one another. The groundwater flow directions at the following site groupings were consistent with the overall groundwater flow pattern for the installation (ABB-ES, 1992).

<u>Site Grouping</u>	<u>Groundwater Flow Direction</u>
Sites 1, 2, 17, and 18	South to southwest
Site 3	South
Sites 4, 5, 6, 7, and 8	South
Sites 9 and 10	Southeast
Sites 11, 12, 13, and 14	Southeast
Sites 15 and 16	Southwest

No monitoring wells were installed at Sites 29 through 33 during the Phase I investigation.

Horizontal Gradients. Horizontal gradients in the sand-and-gravel aquifer ranged from 0.0016 foot per foot (ft/ft) to 0.0076 ft/ft (ABB-ES, 1992). The horizontal gradients calculated across the six site grouping are as follows.

<u>Site Grouping</u>	<u>Horizontal Gradient (ft/ft)</u>
Sites 1, 2, 17, and 18	0.0029
Site 3	0.0021
Sites 4, 5, 6, 7, and 8	0.0016
Sites 9 and 10	0.0023
Sites 11, 12, 13, and 14	0.0034
Sites 15 and 16	0.0080

Hydraulic Conductivity. Hydraulic conductivity values of the sand-and-gravel aquifer calculated from single-hole permeability test (slug test) data ranged

Table 1-2
Summary of Potential Disposal Sites

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Site No.	Site Name and Type	Location	Period of Operation	Types of Material Disposed	Comments
1	Northwest Disposal Area (landfill)	North Field, west side	1943-1965	Refuse, waste paints, thinners, solvents, waste oils, and hydraulic fluids.	Secondary disposal area during this period; site covers 5 acres.
2	Northwest Open Disposal Area (landfill)	North Field, west side	1976-1984	Construction and demolition debris, tires, and furniture.	Former borrow pit location, commonly referred to as the "Wood Dump."
3	Underground Waste Solvent Storage Area (tank)	North Field, south of Building 2941	1980-1984	Waste solvents, paint stripping residue, and 120-gallon spill.	Wastes generated by paint stripping operations.
4	North AVGAS Tank Sludge Disposal Area	North Field, north of Tow Lane	1943-1968	Tank bottom sludge containing tetraethyl lead.	Sludge disposal in shallow holes near tanks.
5	Battery Acid Seepage Pit (contaminated soil)	South Field, southwest of Building 1454	1964-1984	Waste electrolyte solution containing heavy metals and waste battery acid.	Pits located 110 feet from potable supply well (W-S2).
6	South Transformer Oil Disposal Area (contaminated soil)	South Field, southeast of Building 1454	1940's-1960's	PCB-contaminated dielectric fluid.	Disposal in "O-2" drainage ditch.
7	South AVGAS Tank Sludge Disposal Area (landfill and tanks)	South Field, west of Building 1406	1943-1968	Tank bottom sludge containing tetraethyl lead.	Sludge disposed in shallow holes near tanks.
8	AVGAS Fuel Spill Area (contaminated soil)	South Field, south of Building 1406	Summer 1972	AVGAS containing tetraethyl lead.	Fuel spill of about 25,000 gallons on an area of about 2 acres.
9	Waste Fuel Disposal Pit (landfill)	South Field, east side	1950's-1960's	Waste AVGAS containing tetraethyl lead.	Fuel disposed in former borrow pit.
10	Southeast Open Disposal Area (A) (landfill)	South Field, southeast area	1965-1975	Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, PCBs, pesticides, and herbicides.	Secondary disposal area during this period; site covers about 4 acres.
11	Southeast Open Disposal Area (B) (landfill)	South Field, southeast area	1943-1970	Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, and PCBs.	Secondary disposal area during this period; site covers about 3 acres.

See notes at end of table.

Table 1-2 (Continued)
Summary of Potential Disposal Sites

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Site No.	Site Name and Type	Location	Period of Operation	Types of Material Disposed	Comments
12	Tetraethyl Lead Disposal Area (waste pile)	South Field, southeast area	May 1, 1968	Tank bottom sludge and fuel filters contaminated with tetraethyl lead.	Disposal area posted with warning; site consists of two earth covered mounds; 25 foot by 25 foot area.
13	Sanitary Landfill (landfill)	South Field, southeast area	1979-1984	Refuse, waste solvents, paint, hydraulic fluids, and asbestos.	Primary sanitary landfill, potentially received hazardous wastes the first year of operation.
14	Short-Term Sanitary Landfill (landfill)	South Field, southeast area	1978-1979	Refuse, waste solvents, oils, paint, and hydraulic fluids.	Primary sanitary landfill for brief period; relocated due to drainage problems.
15	Southwest Landfill (landfill)	South Field, southwest area	1965-1979	Refuse, waste paints, oils, solvents, thinners, asbestos, and hydraulic fluid.	Primary landfill for this time period; covers about 15 acres.
16	Open Disposal and Burning Area (landfill)	South Field, southwest area	1943-1965	Refuse, waste paints, oils, solvents, thinners, PCBs, and hydraulic fluid.	Primary disposal area for this time period; covers about 10 acres.
17	Crash Crew Training Area (contaminated soil)	North Field, west side	1951-1991	JP-5 fuel.	Waste fuels and some solvents ignited, then extinguished.
18	Crash Crew Training Area (contaminated soil)	North Field, west side	1951-1991	JP-5 fuel.	Waste fuels and some solvents ignited, then extinguished.
29	Auto Hobby Shop	Area around Building 1404	1943-present	Paint, oils, and solvents	Abandoned underground waste oil tanks.
30	South Field Maintenance Hangar	Area around Building 1406	1943-present	Fuels, solvents, and oils	Abandoned underground waste oil tanks.
31	Sludge Drying Beds and Disposal Areas	Wastewater Treatment Plant and along perimeter roads	1943-1990	Wastewater Treatment Plant sludge.	Sludge from beds spread on ground along perimeter road.
32	North Field Maintenance Hangar	Area around Building 1424	1943-present	Fuels, solvents, and oils	Abandoned underground waste oil tanks.
33	Midfield Maintenance Hangar	Area around Building 1454	1943-present	Fuels, solvents, and oils	Abandoned underground waste oil tanks.
Notes: AVGAS = aviation gasoline. PCB = polychlorinated biphenyls. JP-5 = jet propellant 5.					

from 5.34×10^{-2} to 2.88×10^{-4} centimeters per second (cm/sec). The geometric mean of hydraulic conductivities for the site groupings ranged from 1.91×10^{-2} to 3.61×10^{-3} cm/sec (ABB-ES, 1992). Variability in hydraulic conductivity values in the sand-and-gravel aquifer is likely a result of the wide range of grain sizes and variable grain size distributions that have been observed in the soil of the aquifer.

Seepage Velocity. Seepage velocities that were calculated for the six site groupings ranged from 0.07 to 0.64 foot per day (ft/day).

Aquifer characteristics. Additional hydraulic characteristics of the sand-and-gravel aquifer calculated from a pumping test conducted on the south production well (W-3) are as follows.

Transmissivity = 10,000 to 20,000 square feet per day (ft²/day)
Hydraulic conductivity = 100 to 150 ft/day
Storativity = 0.045 and 0.08 (dimensionless)

UST Investigations, 1991-1994. RI Sites 4, 7, and 8 (also referred to as UST Sites 1467, 1466, and 3054, respectively) have been investigated under the Navy's UST program and, therefore, have not been incorporated into the Navy's IR program. During a Project Managers' meeting at Whiting Field on July 7, 1992, an agreement was reached between the Navy, USEPA, and FDER to sample monitoring wells at Sites 4, 7, and 8 for full scan target compound list (TCL) and target analyte list (TAL) analytes. Based on the results of these analyses, a decision would be made regarding whether Sites 4 and 7 should remain in the Navy's UST program or be transferred into the Navy's IR program. The UST field work was completed between August 16 and 30, 1993, and included the collection of groundwater samples from 11 monitoring wells at Site 4 (UST Site 1467) and 19 monitoring wells at Site 7 (UST Site 1466).

The results of the UST program investigation were reported in the Jurisdiction Assessment Report (ABB-ES, 1994a). The report concluded that the benzene, toluene, ethylbenzene, and xylene (BTEX) and trichloroethylene (TCE) plumes at the Sites 4 and 7 are co-mingled and that petroleum contaminants could not be remediated without design considerations for TCE contamination. Based on these findings, the report recommended that the sites be returned to the IR program. The decision by the Navy, USEPA, and FDEP to act on these recommendations is currently (August 1994) pending.

Site 8 (UST Site 3054) was investigated under a separate contamination assessment conducted on July 17, 1993. The results of the investigation were reported in the Contamination Assessment Report (CAR) Addendum for Site 3054 (IR Site 8), NAS Whiting Field, Milton, Florida (ABB-ES, 1993). Based on the data presented in the CAR Addendum, NFA was recommended for the site. In correspondence dated January 20, 1994, the FDEP formally accepted the NFA recommendations presented in the CAR Addendum for Site 3054. The NFA recommendation was incorporated into a Site Rehabilitation Completion order that has been signed by the Director of the FDEP Division of Waste Management.

1.3 OBJECTIVES OF THE PHASE IIA HYDROGEOLOGIC INVESTIGATION. The objectives of the Phase IIA hydrogeologic investigation were to provide additional character-

ization of the hydrogeologic conditions at NAS Whiting Field. To complete this objective, the following tasks were identified:

- characterize groundwater flow direction for individual sites, site groupings, and the installation as a whole;
- estimate aquifer characteristics including hydraulic conductivity, horizontal gradients, and seepage velocities for specific site groupings and installation as a whole.

Field efforts performed to complete these tasks included installation of monitoring wells, two events of groundwater level measurements, and single hole permeability tests (slug tests) on 40 monitoring wells located throughout the installation.

NAS Whiting Field is located within the boundaries of the Northwest Florida Water Management District (NFWFMD), which encompasses the entire Florida panhandle. The topography of northwest Florida is the result of 25 million years of stream erosion and deposition, and wave action during periods when the shoreline exceeded its present level. The resulting surficial sediments consist of sand and silt mixtures containing interbedded clay lenses.

1.3.1 Hydrostratigraphy Three aquifer systems are present in the panhandle area. Within these systems, three major aquifers have been recognized in Santa Rosa and Escambia Counties. In order of increasing depth the water-bearing units are (Scott, 1992):

- sand-and-gravel aquifer,
- Upper Floridan aquifer, and
- Lower Floridan aquifer.

The typical hydrostratigraphic sequence in the area covering Santa Rosa and Escambia Counties consists of wedge-shaped, predominantly clastic and carbonate sediments dipping toward the southwest (Marsh, 1966). A generalized hydrostratigraphic column is presented in Figure 1-3.

The sand-and-gravel aquifer, which is partly confined, consists of river and marine terrace deposits of the Pleistocene age overlying the Pliocene Citronelle formation. The Citronelle formation, in turn, overlies a coarse clastic Miocene unit at the base of the aquifer (Scott, 1992). These units vary in thickness from 100 to 700 feet. They typically thin out to the north and east, gradually pinching out in central Walton County. Although composed predominantly of sand, the aquifer contains numerous lenses of clay and gravel that are as much as 60 feet thick (NFWFMD, 1982; Marsh, 1966).

The intermediate aquifer separates the sand-and-gravel aquifer from the Upper Floridan aquifer. The intermediate aquifer consists of the upper Pensacola Clay and the lower Pensacola Clay separated by a relatively thin, permeable unit known as the Escambia sand. The Miocene clays, which are mixed with silts and marls, are dense with low hydraulic conductivities and provide an effective confining unit in the southern half of Escambia and Santa Rosa Counties. The confining units range in thickness from about 300 feet within Escambia and Santa Rosa Counties to less than 10 feet to the northeast of these counties. The Escambia sand is less than 75 feet thick in the area (Marsh, 1966; Scott, 1992).

GENERALIZED HYDROSTRATIGRAPHIC COLUMN OF ESCAMBIA AND SANTA ROSA COUNTIES

SERIES	THICKNESS	GRAPHIC SECTION	AQUIFER SYSTEMS
PLEISTOCENE	APPROXIMATE RANGE		MARINE TERRACE DEPOSITS : Sand, tan, fine to coarse
PLEISTOCENE (?)	200' - 1,000'		SAND AND GRAVEL AQUIFER : Citronelle Formation : Sand with lenses of clay and gravel. Sand, light-yellowish-brown to reddish-brown, very fine to very coarse and poorly sorted. Hardpan layers in upper part. Logs and carbonaceous zones present in places.
UPPER MIocene	0' - 500'		AQUICLUDE : Pensacola Clay : Formation Consists of an Upper Member and Lower Member of dark-to-light-gray, tough, sandy clay; separated by the Escambia Sand Member of gray, fine to coarse quartz sand. Contains carbonized plant fragments, and abundant mollusks and foraminifers. Pensacola Clay is present only in southern half of the area, interfingering with the Miocene coarse clastics in the central part.
UPPER MIDDLE TO LOWER MIDDLE MIocene			
LOWER MIocene AND UPPER OLIGOCENE	100' - 150'		UPPER FLORIDAN AQUIFER : Chickasawhay and Tampa Formation Undifferentiated : Tampa: Limestone, light-gray to grayish-white, hard, with several beds of clay; Chickasawhay: Dolomitic limestone, gray, vesicular.
MIDDLE OLIGOCENE	100' - 150'		AQUICLUDE : Bucatunna Clay Member : Clay, dark-gray soft, silty to sandy, foraminiferal, carbonaceous.
UPPER EOCENE			
MIDDLE EOCENE	600' - 900'		LOWER FLORIDAN AQUIFER : Ocala Group : Limestone, light-gray to chalky-white foraminifers extremely abundant. Lisbon Equivalent : Shaly limestone, dark-gray to grayish-cream; hard, compact; glauconitic; with thick intervals of dense, light-gray shale.
LOWER EOCENE	600' - 700'		AQUICLUDE : Tallahatta Formation : Shale and siltstone, light-gray, hard. Hatchetigbee Formation : Clay, gray to dark-gray, micaceous, silty, with beds of glauconitic shale, siltstone, and shaly limestone. Mollusks, foraminifers, corals, echinoids. Bashi Marl Member (about 10 feet thick) at base.

SOURCE: Modified from MUSGROVE, 1965

FIGURE 1-3

GENERALIZED HYDROSTRATIGRAPHIC COLUMN
OF ESCAMBIA AND SANTA ROSA COUNTIES

7560-16 940617WEM



RI PROGRAM PHASE IIA
TECHNICAL MEMORANDUM 4,
HYDROGEOLOGIC ASSESSMENT
NAS WHITING FIELD
MILTON, FLORIDA

The intermediate aquifer overlays the Floridan aquifer in Escambia and Santa Rosa Counties. The Floridan aquifer is separated into two distinct water-bearing units, the Upper Floridan and Lower Floridan aquifers. The Upper Floridan aquifer is represented by the Chickawaway Formation. This formation is Oligocene in age and consists of limestones with relatively thin units of coarse-grained sand and fine-grained gravel.

Separating the Upper Floridan from the Lower Floridan aquifer is the Bucatunna Clay confining unit. In the Pensacola area, this confining unit attains a thickness of more than 200 feet. The unit thins out to the east, and in the vicinity of Choctawhatchee Bay (in Okaloosa and Walton Counties), the unit is absent causing the Floridan aquifer to become one hydraulic unit (Scott, 1992).

The Lower Floridan aquifer is confined above by the Bucatunna Clay and below by the Lower Floridan confining units. The Lower Floridan aquifer consists of late Eocene limestones from the Ocala Group and the lower confining unit is composed of clays and shales of middle Eocene age.

1.3.2 Regional Hydrogeology Groundwater in northwest Florida occurs within three major aquifer systems. These aquifer systems include: the surficial aquifer system (referred to as the sand-and-gravel aquifer in the western panhandle), the intermediate aquifer system and confining unit, and the Floridan aquifer system (NFWFMD, 1988; Scott, 1992).

The three aquifer systems in Escambia and Santa Rosa Counties differ significantly from their counterparts throughout the remainder of the district. For example, the sand-and-gravel aquifer is considerably thicker in the western part of the panhandle than its counterpart (the surficial aquifer) in the eastern part of the panhandle (NFWFMD, 1988). The intermediate system in the eastern part of the panhandle consists of a confining layer that contains thin water-bearing zones. That confining layer is called the Pensacola Clay in Escambia and Santa Rosa Counties. It consists of upper and lower members separated by the Escambia sand member. The upper member pinches out west of Milton and the lower member is absent in the northern half of Escambia and Santa Rosa Counties. The installation is situated at the approximate location where the lower member begins interconnecting with the Miocene coarse clastics. Although the intermediate system contains water-bearing units, it primarily functions as a confining unit between the surficial (sand-and gravel) aquifer and the Floridan aquifer throughout the entire district. The Floridan aquifer in Escambia and Santa Rosa Counties contains a confining unit (the Bucatunna Clay Member of the Byram Formation, middle Oligocene in age) that divides the Floridan aquifer into upper and lower units. The Bucatunna Clay is only present in the western part of the panhandle (NFWFMD, 1988; Scott, 1992).

The sand-and-gravel aquifer is the major water-bearing unit in Santa Rosa County and the only aquifer that has been studied in the IR program. The aquifer consists of a complex sequence of sand, gravel, silt, and clay that is estimated to be approximately 350 feet thick in the vicinity of NAS Whiting Field (Scott, 1992). The presence of interbedded clay layers often creates localized artesian conditions where the less permeable clay deflects the surface of the water table below its true (unconfined) elevation. In some areas, the aquifer may be subdivided into upper and lower zones, which are separated by layers of clay or clayey sand. These semi-confining layers are typically leaky and the upper part serves as the primary source of water to the more productive lower zone of the

aquifer (NFWFMD, 1991). Groundwater can potentially move laterally along the semi-confining layers until it discharges into local streams or other surface water features (NFWFMD, 1991; Scott, 1992).

Throughout most of the Florida panhandle, the bottom of the sand-and-gravel aquifer is typically marked by the intermediate aquifer system. In Escambia County, the Pensacola Clay Formation serves as that confining layer. Throughout most of Santa Rosa County only the lower member of the formation is thought to overlay the top of the Upper Floridan. NAS Whiting Field is located approximately 4 miles south of where the lower member pinches out completely (Musgrove and others, 1965).

Virtually all of the groundwater used in Santa Rosa County is pumped from the sand-and-gravel aquifer. The aquifer is recharged entirely by rainfall. The western panhandle receives between 55 to 67 inches of rainfall per year (NFWFMD, 1988). Evapotranspiration returns approximately 60 percent of the total volume of rainfall to the hydrologic cycle before entering the aquifer systems. Rainfall is generally highest in the summer months and lowest in fall and winter.

The water quality of the sand-and-gravel aquifer is satisfactory for most uses. The concentrations of naturally occurring dissolved minerals are low due to the insolubility of the sand through which the water migrates. The pH of water in the aquifer falls as low as 5.0 in some areas, largely as a result of high concentrations of dissolved iron (Florida Geological Survey [FGS], 1992).

Hydraulic properties of the sand-and-gravel aquifer have been studied throughout Escambia County (NFWFMD, 1991). The results of this work have indicated that the transmissivity of the main producing zone is variable throughout the county (5,000 to 20,000 ft²/day) and that the values from the western part of the county fall within the lower end of the range. The average storativity for the main producing zone is on the order of 1×10^{-4} (dimensionless). Transmissivity calculated from multi-well aquifer tests conducted by the NFWFMD ranged from 5,800 to 7,800 ft²/day with storage coefficients of 2.9×10^{-4} to 5.7×10^{-4} (dimensionless) (NFWFMD, 1991).

Limited information is available on the hydraulic properties of the shallower permeability zones studied as part of the NAS Whiting Field investigations. Pumping tests completed by the NFWFMD in 1986 generated data indicating that the vertical hydraulic conductivity of the lower permeability zone ranged from 0.03 ft/day to 1.3 ft/day (NFWFMD, 1991).

The intermediate aquifer system throughout most of Escambia and Santa Rosa Counties is not a water-bearing unit (Scott, 1992). The unit principally serves as a confining layer between the sand-and-gravel and upper Floridan aquifers. In the vicinity of NAS Whiting Field, the upper Pensacola Clay is absent, thus rendering the Escambia sand (if present) indistinguishable from the sediments of the sand-and-gravel aquifer (Musgrove and others, 1965).

The Floridan aquifer system is present throughout the Florida panhandle. The system is over 1,000 feet thick in the vicinity of NAS Whiting Field (Musgrove and others, 1965). In Santa Rosa and Escambia Counties, the system consists of an upper and lower aquifer separated by a confining layer (the Bucatunna Clay of the Byram Formation). The carbonate sequence, containing the upper and lower Floridan aquifers, dips below the level of the Gulf of Mexico in Escambia County

and becomes saline. Additionally, the carbonate rock is highly soluble in the acidic groundwater, which causes the water to be highly mineralized. Consequently, the aquifer system is not commonly used as a source of water in the western part of the Florida panhandle (NFWFMD, 1982; Scott, 1992).

2.0 SUMMARY OF HYDROGEOLOGIC FIELD INVESTIGATION

The hydrogeologic investigation included the installation of monitoring wells, water level elevation measurement studies, and measurements of aquifer hydraulic properties. The water level survey was conducted to determine groundwater flow directions and to calculate vertical and horizontal gradients. Slug tests were performed to determine the radial hydraulic conductivity values at each monitoring well location, which, along with the hydraulic gradient values and estimated values for porosity, were used to calculate seepage velocities.

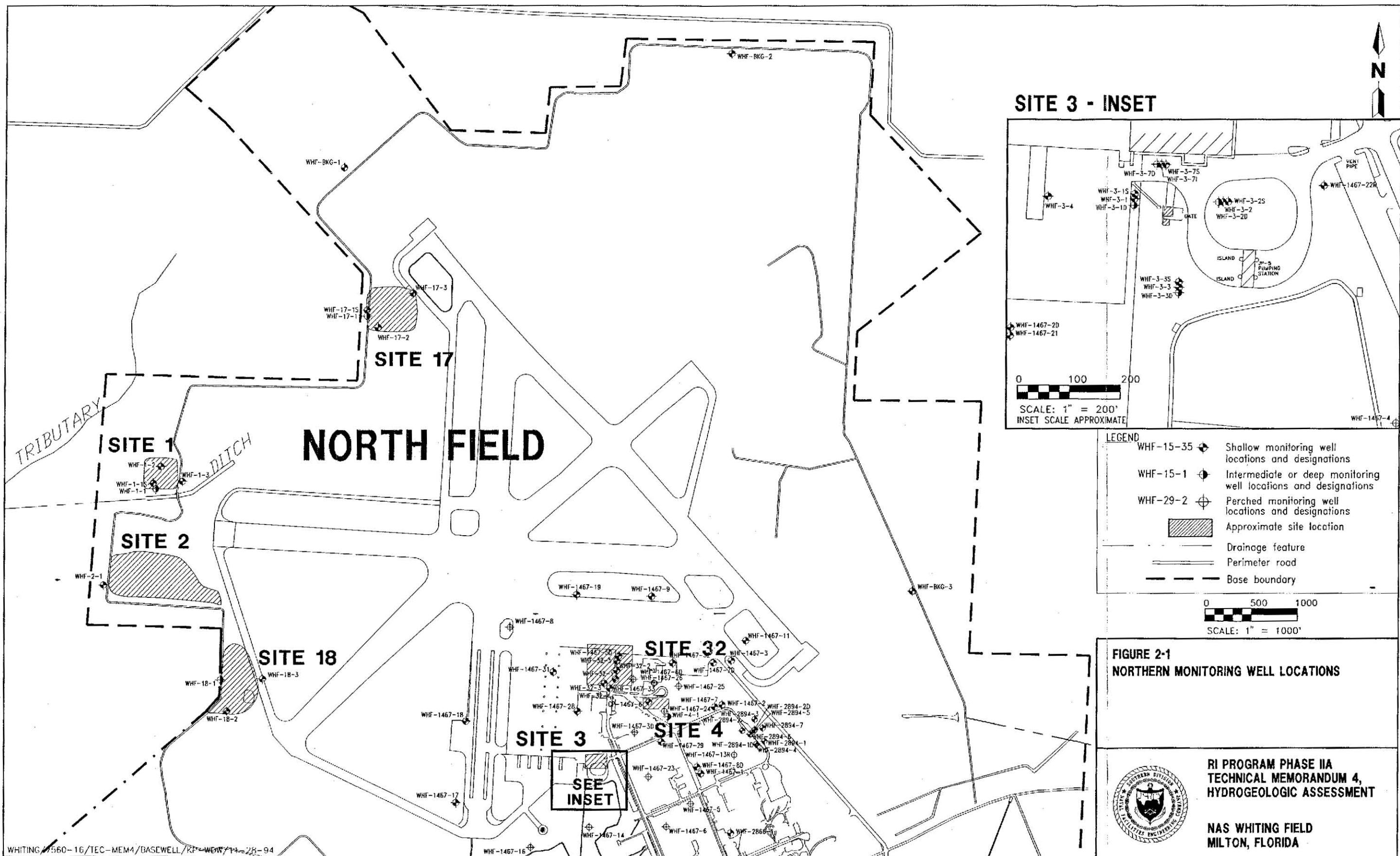
2.1 GROUNDWATER INVESTIGATION. The Phase IIA monitoring well installation part of the groundwater investigation was conducted between January and July 1993. A total of 77 monitoring wells were installed at 18 sites throughout the installation (Figures 2-1 and 2-2).

Monitoring wells were installed using both the hollow-stem auger and mud rotary techniques. The wells were installed by drill crews from the Baton Rouge office of Groundwater Protection, Inc. Lithologic samples were collected at 5-foot intervals during installation using American Society for Testing and Materials (ASTM) Method D1586 for 2-foot split-spoon samples. When installing a cluster of wells (two or more wells in close proximity), the deep well was typically completed first and logged at 5-foot intervals. Soil samples were not collected at the shallow and intermediate well for the cluster; however, samples were collected from the screen interval and at depths suspected to contain a clay layer to ensure that the wells were screened in a productive zone of the aquifer.

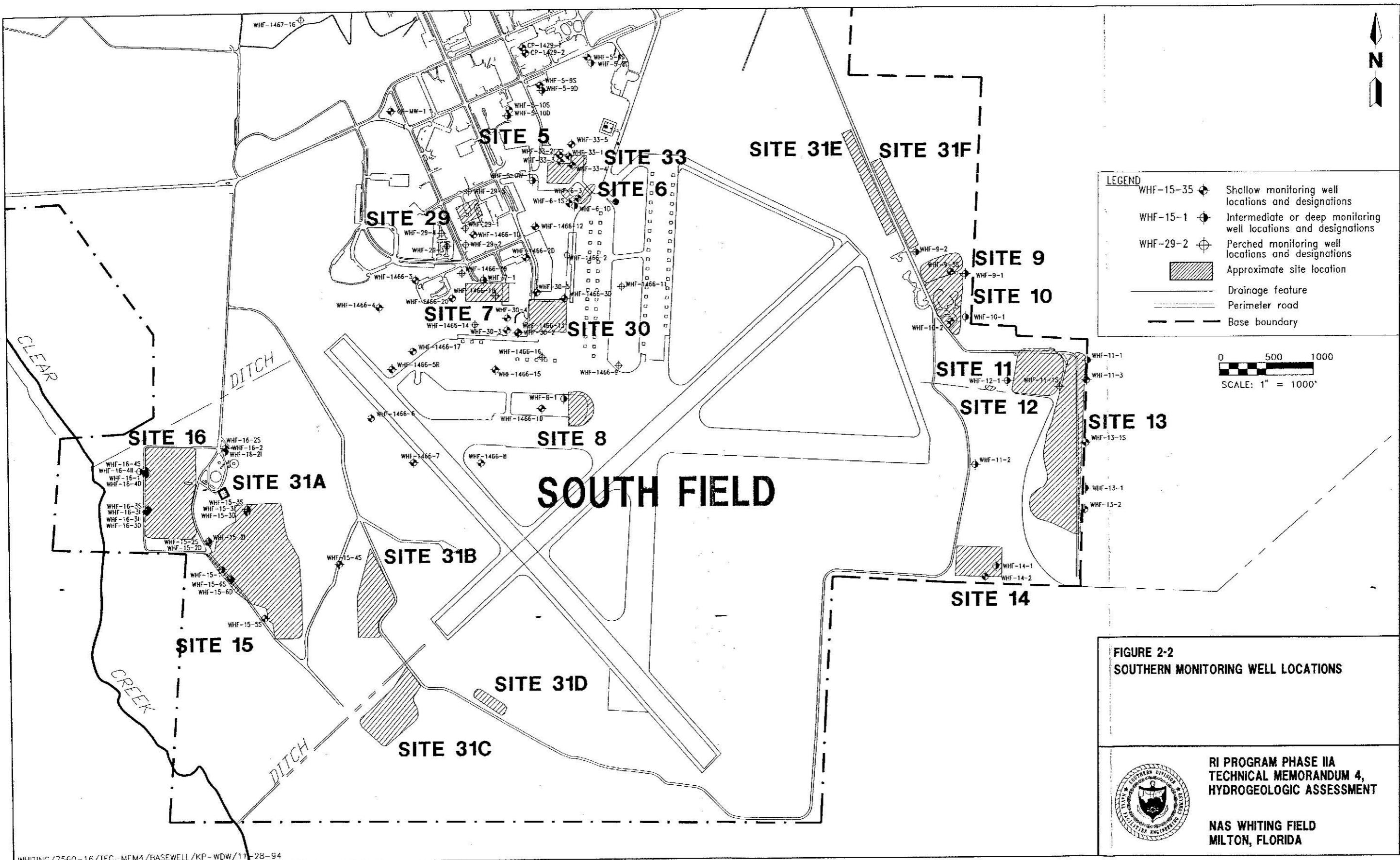
Lithologic samples were screened with an organic vapor analyzer (OVA), described, and archived in a plastic soil sample box. The samples were described using the Unified Soil Classification System (USCS) and recorded in a bound log book. The screen interval samples were collected to define subsurface conditions at a given site. Monitoring well construction details are summarized in Table 2-1.

Shallow Monitoring Well Installation. All shallow monitoring wells (monitoring wells that intercept the water table) at the installation were advanced using 8 $\frac{1}{4}$ -inch outside diameter (OD) hollow-stem augers.

Shallow monitoring wells were constructed in each borehole through hollow portion of the augers and consisted of a threaded 2-inch inside diameter (ID) schedule 40 polyvinyl chloride (PVC) riser pipe attached to a 10- to 15-foot section of 0.010-inch slot PVC well screen. The well screen was placed across the water table to allow for seasonal groundwater fluctuations. A sand pack of 20/30 grade silica sand was placed opposite the well screen in the borehole annulus and brought up to a level approximately 2 feet above the top of the well screen. The augers were removed slowly during the placement of the 20/30 grade sand pack around the annulus of the well screen. This procedure minimized formation caving. A minimum 1-foot layer of bentonite, in pellet form, was then placed in the annular space above the sand pack and the bentonite was hydrated using potable water. After allowing sufficient time for the bentonite to hydrate, a bentonite and cement grout was placed in the remaining annular space and brought up to a level approximately 2 feet below land surface (bls). After the grout had cured, the protective well casing was installed.



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Table 2-1
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bbls)
Background Locations							
WHF-BKG-1	IIA	2	192.52	195.46	121.60	106 to 121	NA
WHF-BKG-2	IIA	2	177.39	180.24	109.22	94 to 109	NA
WHF-BKG-3	IIA	2	144.82	147.57	80.50	65 to 80	NA
Northwest Disposal and Crash Crew Training Areas							
<u>Site 1, Northwest Disposal Area</u>							
WHF-1-1	VS	4	140.49	142.62	123.00	113 to 123	NA
WHF-1-1S	IIA	2	140.54	143.08	75.40	60 to 75	NA
WHF-1-2	IIA	2	142.59	145.61	78.80	63 to 78	NA
WHF-1-3	IIA	2	152.95	155.50	87.48	72 to 87	NA
<u>Site 2, Northwest Open Disposal Area</u>							
WHF-2-1	IIA	2	148.48	150.80	87.42	72 to 87	NA
<u>Site 17, Crash Crew Training Area</u>							
WHF-17-1	VS	4	192.61	194.71	159.00	149 to 159	NA
WHF-17-1S	IIA	2	192.48	194.96	115.50	100 to 115	0 to 35
WHF-17-2	IIA	2	194.33	197.35	121.90	106 to 121	0 to 43
WHF-17-3	IIA	2	198.89	201.21	126.50	111 to 126	NA
<u>Site 18, Crash Crew Training Area</u>							
WHF-18-1	VS	4	161.56	163.57	120.20	110 to 120	NA
WHF-18-2	IIA	2	162.15	164.75	107.86	92 to 107	NA
WHF-18-3	IIA	2	172.73	175.64	112.90	97 to 112	NA
<u>Southwest Disposal Area</u>							
<u>Site 15, Southeast Landfill</u>							
WHF-15-1	VS	4	64.17	66.35	73.20	63 to 73	NA
WHF-15-2I	IIA	2	57.24	60.10	63.20	53 to 63	NA
WHF-15-2S	IIA	2	57.18	59.58	32.90	17 to 32	NA
WHF-15-2D	IIA	2	57.05	59.39	112.44	107 to 112	NA
WHF-15-3D	IIA	2	67.84	69.44	119.48	109 to 119	NA
WHF-15-3I	IIA	2	67.26	69.69	87.83	77 to 87	NA
WHF-15-3S	IIA	2	67.35	69.29	37.94	22 to 37	NA
WHF-15-4S	IIA	2	140.62	143.29	109.15	94 to 109	NA
WHF-15-5S	IIA	2	101.73	104.14	68.18	58 to 68	NA
WHF-15-6D	IIA	2	72.56	75.08	123.36	113 to 123	NA
WHF-15-6S	IIA	2	71.87	74.29	43.73	28 to 43	NA
See notes at end of table.							

Table 2-1 (Continued)
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bsl)
<u>Site 16, Open Disposal and Burning Area</u>							
WHF-16-1	VS	4	47.47	50.04	43.00	33 to 43	NA
WHF-16-2	I	4	79.38	82.19	74.20	69 to 74	NA
WHF-16-2I	IIA	2	78.02	80.60	130.14	120 to 130	NA
WHF-16-2S	IIA	2	80.77	83.66	49.80	34 to 49	NA
WHF-16-3D	IIA	2	48.64	51.40	118.08	108 to 118	NA
WHF-16-3I	IIA	2	48.73	51.31	52.87	47 to 52	NA
WHF-16-3II	IIA	2	48.60	51.22	78.91	73 to 78	NA
WHF-16-3S	IIA	2	48.88	51.69	23.25	8 to 23	NA
WHF-16-4D	IIA	2	49.88	52.87	122.54	112 to 122	0 to 65
WHF-16-4II	IIA	2	50.62	53.01	64.80	54 to 64	NA
WHF-16-4S	IIA	2	52.19	54.79	22.38	7 to 22	NA
WHF-16-5	IIA	2	(¹)	37.54	13.50	3 to 13	NA
<u>Southeast Disposal Area</u>							
<u>Site 9, Waste Fuel Disposal Pit</u>							
WHF-9-1	VS	4	144.66	146.55	118.40	108 to 118	NA
WHF-9-2	I	4	158.11	161.07	124.35	114 to 124	NA
WHF-9-3S	IIA	2	147.92	150.85	108.24	93 to 108	0 to 77
<u>Site 10, Southeast Open Disposal Area (A)</u>							
WHF-10-1	VS	4	144.19	146.73	118.20	108 to 118	NA
WHF-10-2	IIA	2	147.78	150.75	113.14	98 to 113	NA
<u>Site 11, Southeast Open Disposal Area (B)</u>							
WHF-11-1	VS	4	122.48	124.86	128.40	118 to 128	NA
WHF-11-1S	IIA	2	114.91	116.65	54.40	39 to 54	NA
WHF-11-2	I	4	145.19	148.12	125.84	120 to 125	NA
WHF-11-3	IIA	2	114.29	117.19	73.16	58 to 73	0 to 46
<u>Site 12, Tetraethyl Lead Disposal Area</u>							
WHF-12-1	VS	4	134.20	136.40	113.40	103 to 113	NA
<u>Site 13, Sanitary Landfill</u>							
WHF-13-1	VS	4	100.40	102.66	122.90	112 to 122	NA
WHF-13-1S	IIA	2	104.61	108.97	61.30	46 to 61	NA
WHF-13-2S	IIA	2	99.94	102.86	72.41	57 to 72	0 to 42
<u>Site 14, Short-Term Sanitary Landfill</u>							
WHF-14-1	VS	4	137.83	139.69	153.20	143 to 153	NA
WHF-14-2	IIA	2	142.86	145.80	118.30	103 to 118	0 to 94
See notes at end of table.							

Table 2-1 (Continued)
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bls)
Industrial Area							
<u>Site 5, Battery Acid Seepage Pit</u>							
WHF-5-OW-1	I	4	182.48	185.80	177.81	172 to 177	0 to 125
WHF-5-OW-2	I	4	182.78	186.02	116.40	111 to 116	NA
WHF-5-3	VS	4	(¹)	(¹)	150.81	NA	NA
WHF-5-8D	IIA	2	174.81	177.86	174.18	164 to 174	NA
WHF-5-8S	IIA	2	174.75	177.44	128.15	113 to 128	NA
WHF-5-9D	IIA	2	176.34	175.97	180.12	170 to 180	0 to 107
WHF-5-9S	IIA	2	175.85	175.55	128.74	118 to 128	0 to 108
WHF-5-10D	IIA	2	181.56	184.32	183.32	173 to 183	0 to 117
WHF-5-10S	IIA	2	181.06	184.11	144.71	134 to 144	0 to 119
WHF-5-PZ1	I	1	(¹)	186.00	136.78	135 to 136	0 to 125
WHF-5-PZ2	I	1	(¹)	185.90	151.94	150 to 151	0 to 125
<u>Site 6, South Transformer Oil Disposal Area</u>							
WHF-6-1D	IIA	2	177.77	177.55	180.47	175 to 180	0 to 112
WHF-6-1S	IIA	2	177.79	177.63	134.33	124 to 134	0 to 112
WHF-6-3	IIA	2	176.11	175.72	123.45	108 to 123	NA
<u>Site 33, Midfield Maintenance Hangar Area</u>							
WHF-33-1	IIA	2	180.78	180.58	127.44	112 to 127	NA
WHF-33-2	IIA	2	181.69	181.48	128.40	113 to 128	NA
WHF-33-3	IIA	2	182.01	181.79	128.44	113 to 128	NA
WHF-33-4	IIA	2	180.56	180.36	127.94	112 to 127	NA
WHF-33-5	IIA	2	178.51	178.39	125.90	110 to 125	NA
<u>Site 7, South AVGAS Tank Sludge Disposal Area</u>							
WHF-7-1	VS	4	185.06	187.75	143.38	133 to 143	NA
<u>Site 8, AVGAS Fuel Spill Area</u>							
WHF-8-1	VS	4	172.31	173.14	180.70	170 to 180	NA
<u>Site 29, Auto Hobby Shop</u>							
WHF-29-1	IIA	2	193.92	193.53	139.48	124 to 139	NA
WHF-29-2	IIA	2	191.85	191.52	136.90	121 to 136	NA
WHF-29-3	IIA	2	194.36	194.02	139.64	124 to 139	NA
WHF-29-4	IIA	2	196.17	195.78	139.10	124 to 139	NA
WHF-29-5	IIA	2	193.78	193.47	132.14	117 to 132	NA

See notes at end of table.

Table 2-1 (Continued)
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bbls)
Site 30, South Field Maintenance Hangar Area							
WHF-30-3	IIA	2	179.29	179.11	134.60	119 to 134	NA
WHF-30-4	IIA	2	181.88	181.49	135.44	120 to 135	NA
WHF-30-5	IIA	2	182.16	181.89	157.53	147 to 157	NA
Site 3, Underground Waste Solvent Storage Area							
WHF-3-1	VS	4	173.43	174.92	153.17	143 to 153	NA
WHF-3-1D	IIA	2	173.22	172.97	180.29	170 to 180	0 to 104
WHF-3-1S	IIA	2	173.24	172.97	123.22	113 to 123	0 to 105
WHF-3-2	VS	4	173.32	175.37	153.20	143 to 153	NA
WHF-3-2D	IIA	2	173.41	173.14	176.17	171 to 176	NA
WHF-3-2S	IIA	2	(¹)	172.78	114.12	99 to 114	NA
WHF-3-3D	IIA	2	175.90	175.69	180.57	170 to 180	0 to 112
WHF-3-3	I	4	175.72	178.18	154.22	149 to 154	0 to 120
WHF-3-3S	IIA	2	175.46	175.23	110.80	100 to 110	NA
WHF-3-4	IIA	2	174.43	174.38	121.45	111 to 121	0 to 102
WHF-3-7D	IIA	2	173.45	173.29	180.54	175 to 180	0 to 109
WHF-3-7I	IIA	2	173.46	173.25	139.92	134 to 139	0 to 109
WHF-3-7S	IIA	2	173.47	173.27	123.80	113 to 123	0 to 109
Site 4, North AVGAS Tank Sludge Disposal Area							
WHF-4-1	VS	4	170.42	172.45	153.07	143 to 153	NA
Site 32, North Field Maintenance Hangar Area							
WHF-32-1	IIA	2	172.13	171.88	110.34	95 to 110	NA
WHF-32-2	IIA	2	172.62	172.27	110.54	95 to 110	NA
WHF-32-3	IIA	2	172.58	(²)	110.02	95 to 110	NA
WHF-32-4	IIA	2	172.07	(²)	110.25	95 to 110	NA
WHF-32-5	IIA	2	172.28	172.15	109.61	94 to 109	NA
UST Monitoring Wells (Site 7)							
WHF-1466-1	NA	4	178.10	177.79	135	120 to 135	NA
WHF-1466-1D	NA	4	191.60	191.24	158	153 to 158	0 to 135
WHF-1466-2	NA	4	181.00	180.72	120	105 to 120	NA
WHF-1466-2D	NA	4	190.40	190.03	144	139 to 144	0 to 133
WHF-1466-3	NA	4	197.70	197.42	145	130 to 145	NA
WHF-1466-3D	NA	4	180.10	179.75	149	144 to 149	0 to 126
WHF-1466-4	NA	4	190.60	190.37	151	132 to 147	NA
See notes at end of table.							

Table 2-1 (Continued)
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bls)
UST Monitoring Wells (Site 30) (continued)							
WHF-1466-5R	NA	4	175.60	175.18	132	117 to 132	NA
WHF-1466-6	NA	4	173.40	173.09	131	115 to 130	NA
WHF-1466-7	NA	4	172.50	172.26	131	115 to 130	NA
WHF-1466-8	NA	4	172.50	172.24	131	116 to 131	NA
WHF-1466-9	NA	4	173.40	173.20	116	100 to 115	NA
WHF-1466-10	NA	4	172.50	172.08	122	107 to 122	NA
WHF-1466-11	NA	4	176.30	175.87	104	89 to 104	NA
WHF-1466-12	NA	4	190.20	189.92	147	125 to 147	NA
WHF-1466-13 (WHF-30-2)	NA	4	177.50	177.31	130	115 to 130	NA
WHF-1466-14	NA	4	181.00	181.05	135	120 to 135	NA
WHF-1466-15	NA	4	178.14	177.81	135	119 to 134	NA
WHF-1466-16	NA	4	176.74	176.49	135	120 to 135	NA
WHF-1466-17	NA	4	178.20	177.91	134	119 to 134	NA
WHF-1466-18	NA	4	185.80	185.58	135	120 to 135	NA
WHF-1466-19	NA	4	189.20	188.81	145	130 to 145	NA
WHF-1466-20	NA	4	188.00	187.76	140	125 to 140	NA
UST Monitoring Wells (Site 4)							
WHF-1467-1	NA	4	168.80	168.51	97	82 to 97	NA
WHF-1467-2	NA	4	157.70	157.44	85	70 to 85	NA
WHF-1467-2D	NA	4	(¹)	(¹)	123	NA	NA
WHF-1467-3	NA	4	157.40	157.25	95	80 to 95	NA
WHF-1467-4	NA	4	175.00	174.64	103	88 to 103	NA
WHF-1467-5	NA	4	173.50	173.27	100	85 to 100	NA
WHF-1467-5D	NA	4	NA	171.77	140	NA	NA
WHF-1467-6	NA	4	176.80	176.54	103	88 to 103	NA
WHF-1467-6D	NA	4	166.40	166.23	102	97 to 102	0 to 88
WHF-1467-7	NA	4	157.70	157.48	85	70 to 85	NA
WHF-1467-7D	NA	4	158.50	158.18	129	124 to 129	0 to 97
WHF-1467-8	NA	4	173.50	173.24	107	92 to 107	NA
WHF-1467-8D	NA	4	169.20	168.85	127	112 to 127	0 to 107
WHF-1467-9	NA	4	163.30	162.99	100	85 to 100	NA
WHF-1467-11	NA	4	156.90	156.49	90	75 to 90	NA
WHF-1467-13R		4	164.90	164.57	90	75 to 90	NA
WHF-1467-14	NA	4	174.70	174.47	110	95 to 110	NA

See notes at end of table.

Table 2-1 (Continued)
Summary of Remedial Investigation and Feasibility Study
Monitoring Well Construction Details

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	RI Phase of Well Completion	Well Size (inches)	Land Surface Elevation (feet msl)	TOC Elevation (feet msl)	Total Well Depth (feet BTOC)	Approximate Screen Interval (feet BTOC)	Surface Casing Length (feet bls)
WHF-1467-16	NA	4	177.60	177.05	115	100 to 115	NA
WHF-1467-17	NA	4	(¹)	115.00	106	91 to 106	NA
WHF-1467-18	NA	4	175.40	175.12	115	100 to 115	NA
WHF-1467-19	NA	4	169.80	169.33	105	90 to 105	NA
WHF-1467-20	NA	4	172.50	172.26	110	95 to 110	NA
WHF-1467-21	NA	4	174.30	173.93	111	96 to 111	NA
WHF-1467-22R	NA	4	172.70	172.38	103	88 to 98	NA
WHF-1467-23	NA	4	172.86	172.57	101	91 to 101	NA
WHF-1467-24	NA	4	170.10	169.77	100	85 to 95	NA
WHF-1467-25	NA	4	160.90	160.85	91	75 to 90	NA
WHF-1467-26	NA	4	166.50	166.28	90	73 to 83	NA
WHF-1467-27	NA	4	174.10	173.74	116	100 to 115	NA
WHF-1467-28	NA	4	173.30	173.03	106	90 to 105	NA
WHF-1467-29	NA	4	169.10	168.96	100	80 to 95	NA
WHF-1467-30	NA	4	174.40	174.23	102.5	87 to 102	NA
WHF-1467-31	NA	4	171.60	171.21	125	99 to 114	NA
WHF-1467-32	NA	4	162.80	162.31	100	82 to 97	NA
WHF-1467-33	NA	4	170.10	169.86	84	69 to 74	NA

¹ Land surface or top of casing elevation not available.

² Top of casing damaged after survey.

Notes: RI = Remedial Investigation.

msl = mean sea level.

TOC = top of casing.

BTOC = below top of casing.

bls = below land surface.

NA = not applicable.

IIA = Remedial Investigation Phase IIA.

VS = Verification Study.

I = Remedial Investigation Phase I.

AVGAS = aviation gasoline.

UST = underground storage tank.

Intermediate and Deep Monitoring Well Installation. The mud rotary drilling technique was used for the installation of intermediate and deep wells (wells in which the top of the screen was set below the water table). For the mud rotary drilling technique, drilling mud was typically collected in shallow pits excavated near the drill rig and lined with plastic sheeting. In areas where a pit could not be dug, such as the Industrial Area, a steel mud tub was used when drilling through concrete or asphalt. The mud was then recirculated and drilling continued until the desired depth was reached. Deep and intermediate wells typically required a 5-foot length of screen. However, the screen length was increased to 10 feet when setting a well in a suspected poorly producing unit such as a silty or clayey sand. The additional length of screen was added to increase the productivity of the wells set in the less conductive material. The individual lithologic descriptions and construction details for each monitoring well are presented in Appendix A.

Mud rotary drilling was also the technique used to install surface casing for the double-cased wells. The casing was installed to control the potential downward migration of contaminants through an existing clay layer. If not installed, the borehole could serve as a conduit for the water of the upper unit (along with any potential contaminants) to migrate to the lower zone of the aquifer. Double-cased wells were installed when a clay layer, greater than 3 feet in thickness, was encountered as confirmed during split-spoon sampling. The outer casing for the well was constructed of 6-inch ID diameter, schedule 40 PVC grouted into the clay layer.

After the grout had set (a minimum of 24 hours), the bottom of the outer casing was drilled through using the mud rotary technique and the monitoring well was constructed at the desired depth.

Monitoring wells were installed during the Phase IIA RI in accordance with the following standards:

- *U.S. Environmental Protection Agency Standard Operating Procedures and Quality Assurance Manual (SOPQAM)*, Environmental Compliance Branch, Region IV, February 1, 1991; and
- *Guidelines for Groundwater Monitoring Well Installation*, March 27, 1989, SOUTHNAVFACENGCOM.

Sampling equipment was thoroughly decontaminated in accordance with procedures presented in Appendix B of the SOPQAM (USEPA, 1991b).

Following installation of the monitoring wells, the locations and elevations for all wells including those installed during the Verification Study (Geraghty & Miller, 1986), were surveyed by Northwest Florida Engineering and Surveying (Florida-registered land surveyors). The horizontal and vertical positions of the wells were located to a closing error within 0.10 and 0.01 foot, respectively. Elevations were recorded for the top of the well casing, the top of the protective casing, and the top of the concrete pad. The surveyed elevations are summarized in Table 2-1.

2.2 WATER LEVEL MEASUREMENT SURVEY. Two rounds of recording water level elevation measurements were conducted during the Phase IIA RI. The first round

was conducted between September 30 and October 1, 1993. Water level elevations were recorded from 100 monitoring wells installed at the installation (76 of the 77 Phase IIA monitoring wells and 24 existing monitoring wells). The second round of the water level elevations was recorded on February 8 and 9, 1994, and included 98 of the 100 RI monitoring wells and 49 wells installed under the UST program. The groundwater measurements were collected using either Solinst™ or a Keck™ electronic water level indicator. The water level indicators were decontaminated between measurements.

Groundwater Flow Directions. Groundwater flow directions were determined by importing the water level elevation data into Quick Surf™ contouring program, which was used to produce groundwater contour maps. Where sufficient numbers of wells screened in perched zones and deep zones of the sand-and-gravel aquifer existed, separate contour maps were produced for each aquifer zone.

Horizontal and Vertical Gradients. Horizontal and vertical potentiometric gradients were calculated using both rounds of groundwater elevation measurement data. Horizontal hydraulic gradients were calculated for both individual sites and groups of sites in close geographic proximity.

The horizontal gradient for individual sites or site groupings was calculated by choosing two wells (ideally parallel to groundwater flow direction), calculating the difference in their water level elevations (h), and dividing it by the distance between the two wells (l):

$$i = h/l \quad (1)$$

where i = horizontal hydraulic gradient,
 h = difference in water level elevation ($h=w_1-w_2$),
 w_1 = water level of the upgradient well,
 w_2 = water level of the downgradient well, and
 l = distance between the wells.

The results for these calculations are presented in Chapter 3.0.

Vertical hydraulic gradients were calculated to determine the vertical flow direction (upward or downward) for each site containing proximal wells screened at different elevations. Vertical hydraulic gradients were calculated using water level elevation data from the deep and shallow wells in a given monitoring well cluster. Vertical gradients were also collected from monitoring wells that were spatially close (separated by less than 100 feet) and were screened in the shallow and deep zones of the sand-and-gravel aquifer (e.g., WHF-14-1 and WHF-14-2, which are approximately 100 feet apart).

The calculations were performed by computing the difference in water level elevations between the two wells and dividing that difference by the difference in elevation between the bottom of the wells. This ratio is used to estimate vertical flow velocity relative to other sites at the installation. The direction of vertical flow is simply determined by comparing the water level elevations of the two wells. Downward flow is indicated when the water level elevation in the shallow well is higher than that of the deeper well. The vertical hydraulic gradient is governed by the same equation as horizontal gradients:

$$i = h/l \quad (2)$$

where i = vertical hydraulic gradient,
 h = difference in water level elevation between the shallow and deep well,
 w_1 = water level elevation in the shallow well,
 w_2 = water level elevation in the deep well, and
 l = the distance between the bottom of the two wells.

The results of the vertical hydraulic gradient calculations and the direction of vertical flow are presented in the following chapter.

2.3 AQUIFER TESTING AND SLUG TESTS. Single-hole permeability tests (slug tests) were conducted between February 10 and 18, 1994, following the groundwater sampling program and completion of the second round of groundwater elevation measurements.

Forty monitoring wells were selected for slug test analyses during the RI Phase IIA investigations. Monitoring wells were selected to include RI sites that had not previously had slug test analyses performed during the RI Phase I hydrogeologic investigation. In addition, monitoring wells were selected that would reflect hydrologic variations caused by variable lithologic within a site boundary.

Preliminary data such as the total depth of the monitoring wells and depth to water level were collected prior to beginning the slug testing activities. All slug tests were conducted in accordance with the ABB-ES Standard Operating Procedure (SOP) ND-GWHD-002-00, Single Hole Aquifer (or Slug) Tests (ABB-ES, 1994c), using an In Situ™ Hermit data logger (Model No. 2000c), a pressure transducer, a 3-foot (1.6-inch diameter) long, hollow stainless-steel slug, and a Solinst™ electronic water level meter. Two methods of slug testing, referred to as falling and rising head tests, were conducted at the installation.

During a falling head test, groundwater is abruptly displaced upwards by quickly submerging a slug into the water column. The recovery of the displaced water level is then monitored with a pressure transducer as it falls back to its original or equilibrium level. Conversely, groundwater is abruptly displaced downwards during the rising head test by completely retrieving a submerged slug from the water column. The subsequent recovery of the water level is then monitored with a pressure transducer as it rises back to its pre-displaced or equilibrium level.

A minimum of three tests (or trials) were performed in each well to provide an average hydraulic conductivity (K) of the aquifer matrix around the well screens. For shallow wells screened across the water table, only rising head tests were conducted. Falling head tests for wells screened in this manner have been proven to be overestimated (Bouwer, 1989) and were not conducted during this investigation. Four to six rising and falling tests were performed at deep wells, intermediate wells, and those shallow wells screened completely below the water table.

The arrays of drawdown versus time data were then downloaded to a computer for subsequent retrieval and data analysis. The data were analyzed using the

AQTESOLV™ computer program (Geraghty & Miller, 1989) to calculate hydraulic conductivity according to the Bouwer and Rice method (Bouwer and Rice, 1976a). Individual slug test results are presented in Appendix B.

The K values calculated for each run were evaluated according to the ABB-ES SOP ND-GWHYD-003-00, *Slug Test Data Evaluation* (ABB-ES, 1994d). Outlying values were deleted from the data set according to procedures described in the SOP. The entire data set for an individual monitoring well consisted of the remaining K values. The data set was deemed unusable if the percent variance of the highest and lowest K values in the set exceeded 20 percent. Table 2-2 presents the validation results of the hydraulic conductivity data from the slug tests. The results of the slug test data evaluation are presented in Chapter 3.0.

Hydraulic Conductivity and Seepage Velocity. Area-specific hydraulic conductivities and seepage velocities were calculated from slug test data in the following manner. Data sets for deep and intermediate wells were separated from those of the shallow monitoring wells and separate geometric means for each group were calculated. The arithmetic mean for each set of hydraulic conductivity data was calculated for each well. Next, the geometric mean of the resulting hydraulic conductivity values was calculated for all the monitoring wells within each area. A geometric mean was calculated when the values in a data set varied by two orders of magnitude or more within the same hydrogeologic unit. Calculating an arithmetic mean for such a data set gives more weight to the more permeable values, whereas the geometric mean provides a more representative description of the average hydraulic conductivity (Fetter, 1988). The geometric mean is calculated by taking the natural log of each K value, averaging the natural logs, and calculating the exponential (e^x) of that value.

Once the hydraulic conductivity (K) was calculated, the average seepage or pore water velocity was calculated from a modified form of Darcy's law. The calculations used an assumed effective porosity (n) of 0.35 for all sites. The value represents silty through poorly graded sands (Fetter, 1988).

$$V_s = Ki/n_e \quad (2)$$

where

V_s = seepage velocity (ft/day),
K = hydraulic conductivity (ft/day),
i = horizontal hydraulic gradient (ft/ft), and
 n_e = effective porosity (dimensionless).

The results of the seepage velocity calculations are presented in Chapter 3.0.

43 8/10 to
1 8/10

Table 2-2
Validation of Hydraulic Conductivity Data
from Slug Tests

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Well Designation	Rising (R)/ Falling (F) Head Test	Runs Completed/ No. of Runs Used in Final Calculations	Hydraulic Conductivity (K) Range (ft/min)	Percent Difference	Arithmetic Mean for K (ft/min)	Remarks
WHF-BKG-2	R	2/2	0.00163 to 0.00512	72%	--	Values exceed precision standards. All data rejected.
WHF-1-1S	R	3/3	0.01256 to 0.01412	11%	0.01352	None
WHF-2-1	R	3/3	0.01166 to 0.01413	17%	0.01329	None
WHF-3-3S	R	3/3	0.000598 to 0.000643	7%	0.00062	None
WHF-3-3D	R/F	4/4	0.00189 to 0.00221	14%	0.00206	None
WHF-3-7S	R	3/3	0.00271 to 0.002241	8%	0.00218	None
WHF-3-7D	R/F	4/4	0.02864 to 0.04682	39%	0.02879	Initial values indicate clustering effect. Recalculate using separate rising and fall head runs.
	R	4/2	0.02864 to 0.02894	1%		
	F	4/2	0.04533 to 0.04682	3%		
WHF-5-8S	R/F	4/4	0.002074 to 0.004034	48%	0.00365	Initial values indicate clustering effect for combined rising and falling tests.
	R	4/2	0.003274 to 0.004034	19%		
	F	4/2	0.002074 to 0.002123	3%		
WHF-5-8D	R/F	4/4	0.000211 to 0.000361	41%	0.00021	Initial values indicate clustering effect. Recalculate using rising vs. falling head test ranges.
	R	4/2	0.000211 to 0.000223	3%		
	F	4/2	0.000324 to 0.000361	10%		
WHF-5-10S	R/F	4/4	0.01943 to 0.04689	> 100%	0.02164	Run 1 (K=0.05007) is an outlier and shows a typical filter pack effect (8 seconds recovery). Recalculate using runs 2, 3, and 4.
	R/F	4/3	0.01943 to 0.02442	20%		
WHF-5-10D	R/F	4/4	0.01256 to 0.01503	17%	0.01411	None
WHF-6-1S	R	3/3	0.000234 to 0.000267	12%	0.00025	None
WHF-6-1D	R	4/4	0.01073 to 0.01201	10%	0.01157	None
WHF-10-2	R	2/2	0.01563 to 0.02167	28%	--	Initial values indicated possible filter pack effect (recovery in 10 seconds). All data rejected.
WHF-11-2	R/F	6/6	Not applicable	> 100%		Data rejected. Scattered data unmanageable.
WHF-11-3	R	3/3	0.003064 to 0.003635	16%	0.00328	None

See notes at end of table.

Table 2-2 (Continued)
Validation of Hydraulic Conductivity Data
from Slug Tests

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Well Designation	Rising (R)/ Falling (F) Head Test	Runs Completed/ No. of Runs Used in Final Calculations	Hydraulic Conductivity (K) Range (ft/min)	Percent Difference	Arithmetic Mean for K (ft/min)	Remarks
WHF-13-2S	R/F	6/6	0.009184 to 0.01077	15%	0.0101	None
WHF-14-2	R/F	4/4	0.004701 to 0.005954	21%	0.00594	Initial values indicate clustering effect for combined rising and falling tests. Recalculate using separate rising and falling tests.
	R	4/2	0.005922 to 0.005954	1%		
	F	4/2	0.004701 to 0.004975	6%		
WHF-15-2S	R	3/3	0.004622 to 0.004761	3%	0.00469	None
WHF-15-2I	R/F	5/5	0.015580 to 0.020050	22%	0.01938	Run 5 was an outlier and discarded. Recalculate using remaining runs.
	R/F	5/4	0.018050 to 0.020050	10%		
WHF-15-2D	R	6/3	0.000485 to 0.000534	9%	0.00051	Initial values indicated clustering effect. Recalculate using separate rising and falling tests.
	F	6/3	0.000668 to 0.000723	8%		
WHF-15-3S	R	3/2	0.006168 to 0.006218	5%	0.0062	Run 3 is an outlier and was rejected.
WHF-15-3I	R/F	4/4	0.01409 to 0.01628	13%	0.01533	None
WHF-15-3D	R/F	6/6	0.003336 to 0.003995	16%	0.00393	Initial values indicate clustering effect. However, values were within precision range. Recalculate separate rising and falling head tests.
	R	6/3	0.003881 to 0.003995	3%		
	F	6/3	0.003336 to 0.003566	6%		
WHF-15-6S	R	3/3	0.002433 to 0.002638	8%	0.00255	None
WHF-16-2S	R	4/4	0.01889 to 0.02150	12%	0.020015	None
WHF-16-2I	R/F	6/4	0.006379 to 0.007217	12%	0.00676	Runs 5 and 6 were outliers and rejected. Mean computed from runs 1 through 4.
WHF-16-3S	R	3/3	0.002772 to 0.003166	12%	0.0298	None
WHF-16-3I	R/F	6/6	0.003419 to 0.007782	56%	0.00352	Run 5 (K = 0.007782) was an outlier and discarded.
	R/F	6/5	0.003419 to 0.003668	7%		
WHF-16-3II	R/F	6/6	0.01811 to 0.03221	44%	0.03228	Initial values indicate clustering effect. Recalculate using separate rising and fall head runs.
	R	6/3	0.03054 to 0.03410	10%		
	F	6/3	0.01811 to 0.02143	15%		

See notes at end of table.

Table 2-2 (Continued)
Validation of Hydraulic Conductivity Data
from Slug Tests

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Well Designation	Rising (R)/ Falling (F) Head Test	Runs Completed/ No. of Runs Used in Final Calculations	Hydraulic Conductivity (K) Range (ft/min)	Percent Difference	Arithmetic Mean for K (ft/min)	Remarks
WHF-16-3D	R/F	6/6	0.000185 to 0.000631	71%	0.00019	Initial values indicate clustering effect. Recalculate using separate rising and fall head runs.
	R	6/3	0.000185 to 0.000208	11%		
	F	6/3	0.000400 to 0.000631	37%		
WHF-17-2S	R	3/3	0.00255 to 0.00312	18%	0.00278	None
WHF-18-2	R	2/2	0.05739 to 0.07613	25%	—	Initial values indicated possible filter pack effect (recovery in 10 seconds). All data rejected.
WHF-29-1	R	3/0	0.0211 to 0.02422	13%	—	Data rejected. Recovery in 8 seconds. Values appear to represent filter pack drainage only.
WHF-29-5	R	3/2	0.007329 to 0.007334	<1%	0.00733	Run 3 rejected. Recovery is 6 seconds, indicative of filter pack drainage.
WHF-30-3	R	3/3	0.000405 to 0.0004635	13%	0.00044	None
WHF-30-5	R	3/2	0.01335 to 0.01364	2%	0.0135	Run 1 was outlier and rejected.
WHF-32-5	R	3/3	0.005156 to 0.005389	4%	0.00528	None
WHF-33-3	R	3/3	0.003893 to 0.004606	15%	0.0043	None
WHF-33-5	R	3/3	0.009808 to 0.01007	3%	0.00992	None
Notes: R = rising head slug test. F = falling head slug test. K = hydraulic conductivity. ft/min = feet per minute. %D = percent difference				% = percent. > = greater than. < = less than.		
Total Data Completeness = 89 percent.						

3.0 RESULTS AND INTERPRETATIONS

To evaluate hydraulic conditions at the facility, sites in close proximity to each other were grouped and evaluated together as a single unit. By combining the data from several sites in a close geographic area, a larger database was obtained.

The defined site groupings and the sites they contain are as follows:

- the Northwest Disposal and Crash Crew Training Areas, Sites 1, 2, 17, and 18;
- the Southwest Disposal Area, Sites 15 and 16;
- the Southeast Disposal Area, Sites 9, 10, 11, 12, 13, and 14; and
- the Industrial Area, Sites 3, 4, 5, 6, 7, 8, 29, 30, 32, and 33.

The individual site names and disposal materials are provided in Table 1-2.

Discussions of hydrogeologic properties are presented in two sections. Section 3.1 provides the hydrogeologic characteristics of four site groupings delineated at NAS Whiting Field, and Section 3.2 summarizes the installation-wide hydrogeologic conditions.

One of the RI sites, Site 31, is not included in the above site groupings. Based on the disposal methods and disposal quantities, a groundwater investigation and hydrogeologic characterization of the site were not believed to be warranted.

3.1 AREA-SPECIFIC HYDROGEOLOGIC CONDITIONS. The following subsections present the groundwater flow directions, vertical and horizontal hydraulic gradients, hydraulic conductivities, and seepage velocities for each of the individual site groupings.

3.1.1 Northwest Disposal and Crash Crew Training Areas The Northwest Disposal and Crash Crew Training Area (Figure 3-1) encompasses Sites 1 (Northwest Disposal Area), 2 (Northwest Open Disposal Area), and 17 and 18 (Crash Crew Training Areas). The hydrogeologic field investigation of the area included: collecting water level data from 10 Phase IIA RI monitoring wells and 3 wells constructed during the Verification Study (Geraghty & Miller, 1986) and conducting slug test analyses on 4 monitoring wells.

Groundwater Flow Direction. Table 3-1 summarizes the results of the water level measurements recorded during the Phase IIA RI field program. The shallow groundwater flow directions were calculated for each of the two groundwater measurement events. The data from both measurement events indicated a groundwater flow direction to the south-southwest. Because groundwater flow patterns between the two measurement events were similar, only a map detailing the February 8 and 9, 1994, event (Figure 3-1) is included in the body of this report. A water table contour map of the September 30 and October 1, 1993, measurement event is provided in Appendix C.

Table 3-1
Summary of Water Level Elevations

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (ft msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)
			Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft msl)	Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft msl)	
Background Locations							
WHF-BKG-1	195.46	121.60	108.46	87.00	109.76	85.70	89 to 74
WHF-BKG-2	180.24	109.22	96.82	83.42	98.74	81.50	86 to 71
WHF-BKG-3	147.57	80.50	72.90	74.67	75.12	72.45	106 to 91
Northwest Disposal and Crash Crew Training Areas							
<u>Site 1, Northwest Disposal Area</u>							
WHF-1-1	142.62	123.00	64.70	77.92	66.00	76.62	27 to 17
WHF-1-1S	143.08	75.40	64.40	78.68	65.84	77.24	83 to 68
WHF-1-2	145.61	78.80	66.13	79.48	67.53	78.08	82 to 67
WHF-1-3	155.50	87.48	76.68	78.82	78.02	77.48	82 to 67
<u>Site 2, Northwest Open Disposal Area</u>							
WHF-2-1	150.80	87.42	77.96	72.84	79.18	71.62	78 to 63
<u>Site 17, Crash Crew Training Area</u>							
WHF-17-1	194.71	159.00	111.10	83.61	112.39	82.32	45 to 35
WHF-17-1S	194.96	115.50	111.29	83.67	112.60	82.36	94 to 79
WHF-17-2	197.35	121.90	114.05	83.30	115.35	82.00	90 to 75
WHF-17-3	201.21	126.50	117.52	83.69	117.12	84.09	89 to 74
<u>Site 18, Crash Crew Training Area</u>							
WHF-18-1	163.57	120.20	93.29	70.28	94.53	69.04	54 to 44
WHF-18-2	164.75	107.86	95.82	68.93	97.04	67.71	72 to 57
WHF-18-3	175.64	112.90	104.30	71.34	105.59	70.05	77 to 62
Southwest Disposal Area							
<u>Site 15, Southeast Landfill</u>							
WHF-15-1	66.35	73.20	26.38	39.97	26.92	39.43	4 to -6
WHF-15-2I	60.10	63.20	19.80	40.30	20.26	39.84	7 to 2
WHF-15-2S	59.58	32.90	19.00	40.58	19.43	40.15	42 to 27
WHF-15-2D	59.39	112.44	19.06	40.33	19.57	39.82	-47 to -52
WHF-15-3D	69.44	119.48	25.89	43.55	26.68	42.76	-40 to -50
WHF-15-3I	69.69	87.83	26.59	43.10	27.34	42.35	-7 to -17
WHF-15-3S	69.29	37.94	25.93	43.36	27.67	41.62	47 to 32
WHF-15-4	143.29	109.15	98.41	44.88	99.63	43.66	48 to 33
WHF-15-5	104.14	68.18	64.33	39.81	65.08	39.06	45 to 35
WHF-15-6D	75.08	123.36	35.40	39.68	35.61	39.47	37 to -47
WHF-15-6S	74.29	43.73	34.40	39.89	34.62	39.67	46 to 31
See notes at end of table.							

Table 3-1 (Continued)
Summary of Water Level Elevations

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)
			Water Level (ft BTOC)	Water Level (ft msl)	Water Level (ft BTOC)	Water Level (ft msl)	
<u>Site 16, Open Disposal and Burning Area</u>							
WHF-16-1	50.04	43.00	11.35	38.69	11.61	38.43	17 to 7
WHF-16-2	82.19	74.20	37.52	44.67	38.32	43.87	12 to 7
WHF-16-2I	80.60	130.14	36.19	44.41	36.89	43.71	-38 to -48
WHF-16-2S	83.66	49.80	38.91	44.75	39.73	43.93	48 to 33
WHF-16-3D	51.40	118.08	10.16	41.24	10.51	40.89	-56 to -66
WHF-16-3I	51.31	52.87	13.25	38.06	13.46	37.85	3 to -1
WHF-16-3II	51.22	78.91	12.69	38.53	13.48	37.74	-26 to -31
WHF-16-3S	51.69	23.25	13.48	38.21	13.57	38.12	43 to 27
WHF-16-4D	52.87	122.54	14.00	38.87	14.24	38.63	-59 to -79
WHF-16-4II	53.01	64.80	14.00	39.01	14.26	38.75	0 to -9
WHF-16-4S	54.79	22.38	15.49	39.30	15.74	39.05	47 to 32
WHF-16-5	37.54	10.00	--	--	3.54	34.00	34 to 24
<u>Southeast Disposal Area</u>							
<u>Site 9, Waste Fuel Disposal Pit</u>							
WHF-9-1	146.55	118.40	86.72	59.83	89.34	57.21	39 to 29
WHF-9-2	161.07	124.35	100.03	61.04	102.69	58.38	44 to 36
WHF-9-3S	150.85	108.24	90.78	60.07	93.35	57.50	57 to 42
<u>Site 10, Southeast Open Disposal Area (A)</u>							
WHF-10-1	146.73	118.20	88.12	58.61	90.62	56.11	39 to 29
WHF-10-2	150.75	113.14	92.04	58.71	94.58	56.17	49 to 34
<u>Site 11, Southeast Open Disposal Area (B)</u>							
WHF-11-1	124.86	128.40	51.08	73.78	63.42	61.44	7 to -2
WHF-11-1S	116.65	54.40	45.50	71.15	45.99	70.66	78 to 63
WHF-11-2	148.12	125.84	93.50	54.62	95.93	52.19	27 to 22
WHF-11-3	117.19	73.16	61.91	55.28	64.22	52.97	59 to 44
<u>Site 12, Tetraethyl Lead Disposal Area</u>							
WHF-12-1	136.40	113.40	80.20	56.20	82.68	53.72	33 to 23
<u>Site 13, Sanitary Landfill</u>							
WHF-13-1	102.66	122.90	50.62	52.04	52.90	49.76	-9 to -19
WHF-13-1S	108.97	61.30	55.25	53.72	57.59	51.38	61 to 46
WHF-13-2S	102.86	72.41	51.61	51.25	53.85	49.01	45 to 30
<u>Site 14, Short-Term Sanitary Landfill</u>							
WHF-14-1	139.69	153.20	88.49	51.20	90.79	48.90	-3 to -13
WHF-14-2	145.80	118.30	95.15	50.65	97.45	48.35	42 to 27
See notes at end of table.							

Table 3-1 (Continued)
Summary of Water Level Elevations

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)			
			Water Level (ft BTOC)	Water Level (ft msl)	Water Level (ft BTOC)	Water Level (ft msl)				
Industrial Area										
<u>Site 5, Battery Acid Seepage Pit</u>										
WHF-5-OW-1	185.80	177.81	123.42	62.38	125.11	60.69	17 to 7			
WHF-5-OW-2	186.02	116.40	115.67	70.35	-	(¹)	69 to 69			
WHF-5-3	(²)	150.81	120.01	(²)	121.77	(²)	(²)			
WHF-5-8D	177.86	174.18	111.99	65.87	113.73	64.13	5 to -4			
WHF-5-8S	177.44	128.15	110.91	66.53	112.47	64.97	64 to 49			
WHF-5-9D	175.97	180.12	111.47	64.5	113.21	62.76	6 to -3			
WHF-5-9S	175.55	128.74	111.02	64.53	112.83	62.72	56 to 46			
WHF-5-10D	184.32	183.32	120.72	63.6	122.39	61.93	11 to 1			
WHF-5-10S	184.11	144.71	120.28	63.83	122.03	62.08	51 to 41			
WHF-5-PZ1	186.00	136.78	123.52	62.48	125.18	60.82	50 to 49			
WHF-5-PZ2	185.90	151.94	122.79	63.11	124.49	61.41	34 to 33			
<u>Site 6, South Transformer Oil Disposal Area</u>										
WHF-6-1D	177.55	180.47	115.81	61.74	117.61	59.94	5 to 0			
WHF-6-1S	177.63	134.33	115.93	61.7	117.74	59.89	55 to 45			
WHF-6-3	175.72	123.45	113.27	62.45	115.14	60.58	67 to 52			
<u>Site 33, Midfield Maintenance Hangar Area</u>										
WHF-33-1	180.58	127.44	116.99	63.59	118.79	61.79	68 to 53			
WHF-33-2	181.48	128.40	117.96	63.52	119.73	61.75	68 to 53			
WHF-33-3	181.79	128.44	118.36	63.43	120.14	61.65	69 to 54			
WHF-33-4	180.36	127.94	116.91	63.45	118.76	61.6	67 to 52			
WHF-33-5	178.39	125.90	114.59	63.8	116.40	61.99	68 to 53			
<u>Site 7, South AVGAS Tank Sludge Disposal Area</u>										
WHF-7-1	187.75	143.38	129.96	57.79	130.58	57.17	44 to 34			
<u>Site 8, AVGAS Fuel Spill Area</u>										
WHF-8-1	173.14	180.70	117.20	55.94	119.36	53.78	2 to -7			
<u>Site 29, Auto Hobby Shop</u>										
WHF-29-1	193.53	139.48	127.06	66.47	127.77	65.76	68 to 53			
WHF-29-2	191.52	136.90	126.09	65.43	126.71	64.81	69 to 54			
WHF-29-3	194.02	139.64	128.24	65.78	128.88	65.14	70 to 55			
WHF-29-4	195.78	139.10	129.53	66.25	130.19	65.59	72 to 57			
WHF-29-5	193.47	132.14	123.48	69.99	124.14	69.33	76 to 61			
See notes at end of table.										

Table 3-1 (Continued)
Summary of Water Level Elevations

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)
			Water Level (ft BTOC)	Water Level (ft msl)	Water Level (ft BTOC)	Water Level (ft msl)	
Site 30, Southfield Maintenance Hangar Area							
WHF-30-3	179.11	134.60	121.17	57.94	122.76	56.35	59 to 44
WHF-30-4	181.49	135.44	123.90	57.59	125.43	56.06	58 to 43
WHF-30-5	181.89	157.53	123.72	58.17	125.43	56.46	33 to 23
Site 3, Underground Waste Solvent Storage Area							
WHF-3-1	174.92	153.17	105.62	69.3	106.76	68.16	31 to 21
WHF-3-1D	172.97	180.29	103.81	69.16	104.93	68.04	3 to -6
WHF-3-1S	172.97	123.22	103.63	69.34	104.78	68.19	60 to 50
WHF-3-2	175.37	153.20	106.08	69.29	107.21	68.16	32 to 22
WHF-3-2D	173.14	176.17	103.48	69.66	104.69	68.45	-1 to -6
WHF-3-2S	172.78	114.12	101.37	71.41	102.31	70.47	75 to 60
WHF-3-3D	175.69	180.57	106.89	68.8	108.11	67.58	5 to -4
WHF-3-3	178.18	154.22	109.29	68.89	110.45	67.73	28 to 23
WHF-3-3S	175.23	110.80	103.06	72.17	104.42	70.81	75 to 65
WHF-3-4	174.38	121.45	105.02	69.36	106.15	68.23	63 to 53
WHF-3-7D	173.29	180.54	103.86	69.43	104.96	68.33	-1 to -6
WHF-3-7I	173.25	139.92	103.77	69.48	104.89	68.36	38 to 33
WHF-3-7S	173.27	123.80	103.80	69.47	104.89	68.38	60 to 50
Site 4, North AVGAS Tank Sludge Disposal Area							
WHF-4-1	172.45	153.07	101.72	70.73	103.55	68.9	9 to 19
Site 32, Northfield Maintenance Hangar Area							
WHF-32-1	171.88	110.34	98.92	72.96	100.24	71.64	77 to 62
WHF-32-2	172.27	110.54	99.32	72.95	100.64	71.63	76 to 61
WHF-32-3	(^b)	110.02	99.74	(^b)	--	--	77 to 62
WHF-32-4	(^b)	110.25	99.45	(^b)	--	--	77 to 62
WHF-32-5	172.15	109.61	98.60	73.55	99.94	72.21	78 to 63
UST Monitoring Wells (Site 7)							
WHF-1466-1	177.79	135	--	--	125.66	52.13	57 to 42
WHF-1466-1D	191.24	158	--	--	134.46	56.78	38 to 33
WHF-1466-2	180.72	120	--	--	109.25	71.47	75 to 60
WHF-1466-2D	190.03	144	--	--	132.93	57.1	51 to 46
WHF-1466-3	197.42	145	--	--	142.73	54.69	67 to 52
WHF-1466-3D	179.75	149	--	--	123.35	56.4	35 to 30
WHF-1466-4	190.37	151	--	--	136.79	53.58	54 to 39

See notes at end of table.

Table 3-1 (Continued)
Summary of Water Level Elevations

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (ft msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)
			Water Level (ft BTOC)	Water Level (ft msl)	Water Level (ft BTOC)	Water Level (ft msl)	
UST Monitoring Wells (Site 7) (continued)							
WHF-1466-5R	175.18	132	--	--	123.32	51.86	58 to 43
WHF-1466-6	173.09	131	--	--	123.43	49.66	57 to 42
WHF-1466-9	173.2	116	--	--	102.22	70.98	72 to 57
WHF-1466-10	172.08	122	--	--	115.91	56.17	65 to 50
WHF-1466-11	175.87	104	--	--	98.43	77.44	86 to 71
WHF-1466-12	189.92	147	--	--	132.08	57.84	57 to 92
WHF-1466-13 (WHF-30-2)	177.31	130	--	--	120.48	56.83	62 to 47
WHF-1466-14	181.05	135	--	--	111.64	69.41	61 to 46
WHF-1466-15	177.81	135	--	--	124.28	53.53	57 to 42
WHF-1466-16	176.49	135	--	--	117.04	59.45	56 to 41
WHF-1466-17	177.91	134	--	--	125.13	52.78	58 to 43
WHF-1466-18	185.58	135	--	--	125.98	59.60	65 to 50
WHF-1466-19	188.81	145	--	--	133.39	55.42	70 to 55
WHF-1466-20	187.76	140	--	--	133.01	54.75	62 to 47
UST Monitoring Wells (Site 4)							
WHF-1467-2D	(?)	123	--	--	104.09	(?)	(?)
WHF-1467-3	157.25	95	--	--	84.19	73.06	77 to 62
WHF-1467-4	174.64	103	--	--	94.36	80.28	86 to 71
WHF-1467-5	173.27	100	--	--	90.31	82.96	88 to 73
WHF-1467-5D	171.77	140	--	--	99.14	72.63	46 to 31
WHF-1467-6	176.54	103	--	--	94.74	81.80	58 to 43
WHF-1467-6D	166.23	102	--	--	91.27	74.96	69 to 64
WHF-1467-7D	158.18	129	--	--	87.41	70.77	34 to 29
WHF-1467-8	173.24	107	--	--	99.57	73.67	81 to 66
WHF-1467-9	162.99	100	--	--	88.55	74.44	77 to 62
WHF-1467-11	156.49	90	--	--	83.80	72.69	81 to 66
WHF-1467-13R	164.57	90	--	--	81.91	82.66	39 to 74
WHF-1467-14	174.47	110	--	--	99.00	75.47	79 to 64
WHF-1467-16	177.05	115	--	--	104.21	72.84	77 to 62
WHF-1467-18	175.12	115	--	--	105.49	69.63	75 to 60
WHF-1467-19	169.33	105	--	--	95.83	73.50	79 to 64
WHF-1467-21	173.93	111	--	--	107.14	66.79	77 to 62
WHF-1467-23	172.57	101	--	--	91.69	80.88	86 to 71

See notes at end of table.

Table 3-1 (Continued)
Summary of Water Level Elevations

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Monitoring Well Designation	Well TOC Elevation (msl)	Well Depth (ft BTOC)	September 30 and October 1, 1993		February 8 and 9, 1994		Approximate Screen Interval (ft msl)
			Water Level (ft BTOC)	Water Level (ft msl)	Water Level (ft BTOC)	Water Level (ft msl)	
UST Monitoring Wells (Site 4) (continued)							
WHF-1467-24	169.77	100	--	--	88.90	80.87	84 to 69
WHF-1467-25	160.85	91	--		83.89	76.96	84 to 69
WHF-1467-26	166.28	90	--		73.71	92.57	86 to 76
WHF-1467-27	173.74	116	--		104.44	69.30	72 to 57
WHF-1467-28	173.03	106	--	--	102.75	70.28	82 to 67
WHF-1467-29	168.96	100	--	--	87.09	81.87	83 to 68
WHF-1467-30	174.23	102.5	--		95.74	78.49	86 to 71
WHF-1467-31	171.21	125	--		99.84	71.37	61 to 46
WHF-1467-32	162.31	100	--		88.78	73.53	77 to 62
WHF-1467-33	169.86	84	--		77.80	92.06	100 to 85

¹ Well dry during water elevation survey.

² Top of casing elevation not available.

³ Top of casing damaged after survey.

Notes: TOC = top of casing.

msl = mean sea level.

ft BTOC = feet below top of casing.

ft msl = feet below mean sea level.

UST = underground storage tank.

-- = no water level was recorded for this round of sampling.

AVGAS = aviation gasoline.

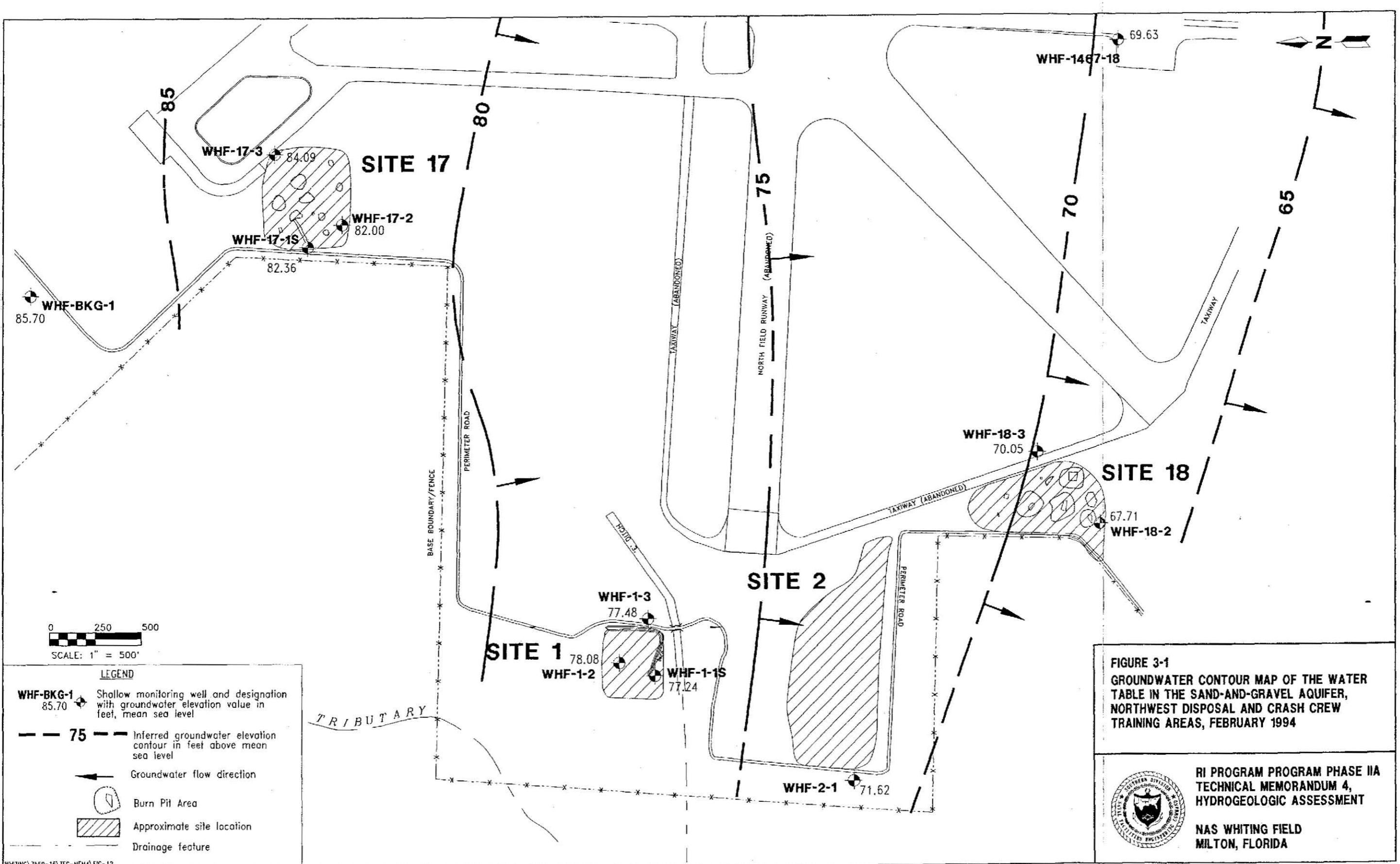


FIGURE 3-1
**GROUNDWATER CONTOUR MAP OF THE WATER
TABLE IN THE SAND-AND-GRAVEL AQUIFER,
NORTHWEST DISPOSAL AND CRASH CREW
TRAINING AREAS, FEBRUARY 1994**



**RI PROGRAM PROGRAM PHASE IIA
TECHNICAL MEMORANDUM 4,
HYDROGEOLOGIC ASSESSMENT**

NAS WHITING FIELD
MILTON, FLORIDA

00234E032

Horizontal and Vertical Gradients. Table 3-2 provides a summary of the horizontal hydraulic gradients calculated for the Northwest Disposal and Crash Crew Training Areas. The horizontal hydraulic gradients in the area ranged from 0.0049 ft/ft (monitoring wells WHF-1-1S and WHF-2-1) to 0.0017 ft/ft monitoring wells WHF-17-1S and WHF-17-2). The average horizontal hydraulic gradient for both measurement events was 0.0038 ft/ft.

Table 3-3 presents a summary of the vertical hydraulic gradients calculated for the Northwest Disposal and Crash Crew Training Areas. The vertical hydraulic gradients were calculated using well pairs at Site 1 (monitoring wells WHF-1-1S and WHF-1-1) and Site 17 (monitoring wells WHF-17-1S and WHF-17-1). Reported values for the paired monitoring wells ranged from 0.01580 ft/ft to 0.00092 ft/ft. Vertical hydraulic gradients were in a downward direction.

Hydraulic Conductivity and Seepage Velocity. Table 3-4 summarizes the hydraulic conductivity values calculated for monitoring wells in the Northwest Disposal and Crash Crew Training Areas. Three trials of rising head slug tests were conducted in four monitoring wells in the Northwest Disposal and Crash Crew Training Areas.

Hydraulic conductivity data from monitoring well WHF-18-2 was rejected because it exceeded the 20 percent variance criteria in the data validation procedure (Table 2-2).

Average hydraulic conductivity values for individual monitoring wells ranged from 4.01 ft/day (1.42×10^{-3} cm/sec) for WHF-17-2 to 19.47 ft/day (6.87×10^{-3} cm/sec) for WHF-1-1S. The screen interval lithology around monitoring wells WHF-1-1S and WHF-2-1 was almost five times more conductive than the lithology around WHF-17-2S. The geometric mean of the hydraulic conductivity data from Sites 1, 2, and 17 was 11.43 ft/day (4.03×10^{-3} cm/sec).

Seepage Velocity. Table 3-5 summarizes the average linear pore water velocity or the calculated seepage velocities for the water table zone of the shallow aquifer for sites in the Northwest Disposal and Crash Crew Training Areas. Seepage velocities for individual sites ranged from 0.02 ft/day at Site 17 to 0.26 ft/day at Sites 1 and 2. The average of the seepage velocity values for the Northwest Disposal and Crash Crew Training Area sites was 0.17 ft/day.

3.1.2 Southwest Disposal Area The Southwest Disposal Area (Figure 3-2) encompasses Sites 15 (Southwest Landfill) and 16 (Open Disposal and Burning Area). The hydrogeologic assessment of the area included: collecting water level data from 20 Phase IIA RI monitoring wells, 1 RI Phase I well, and 2 wells constructed during the Verification Study (Geraghty & Miller, 1986) and conducting slug tests on 11 monitoring wells.

Groundwater Flow Direction. Table 3-1 summarizes the results of the water level measurements recorded during the RI Phase IIA field program. Separate shallow and deep groundwater flow directions were determined for each of the two groundwater measurement events. Because of the limited number of intermediate depth groundwater monitoring wells, the flow direction was not determined for this interval. However, comparison of the intermediate and deep groundwater elevation data suggest the groundwater direction for the intermediate zone is similar to the deep zone. Figures 3-2 and 3-3 illustrate the groundwater flow pattern for measurements recorded on February 8 and 9, 1994. Figures showing the groundwater flow pattern during the September 30 and October 1, 1993, sampling

Table 3-2
Summary of Horizontal Hydraulic Gradients

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Well Designation	Distance Between Wells (feet)	September 30 to October 1, 1993		February 8 and 9, 1994	
		Water Level (msl)	Horizontal Gradient (ft/ft)	Water Level (msl)	Horizontal Gradient (ft/ft)
Northwest Disposal and Crash Crew Training Areas					
WHF-17-1S	218	83.67	0.0017	82.36	0.0017
WHF-17-2		83.30		82.00	
WHF-18-3	511	71.34	0.0047	70.05	0.0046
WHF-18-2		68.93		67.71	
WHF-1-2	205	79.48	0.0039	78.08	0.0041
WHF-1-1S		78.68		77.24	
WHF-1-1S	1,201	78.68	0.0049	77.24	0.0047
WHF-2-1		72.84		71.62	
		Average gradient	0.0038		0.0038
Southwest Disposal Area					
WHF-16-2S	1,063	44.75	0.0062	43.93	0.0055
WHF-16-3S		38.21		38.12	
WHF-15-4S	983	44.88	0.0052	43.66	0.0047
WHF-15-5S		39.81		39.06	
WHF-15-3S	523	43.36	0.0053	41.62	0.0028
WHF-15-2S		40.58		40.15	
		Average gradient	0.0056		0.0043
Southeast Disposal Area					
WHF-9-3S	526	60.07	0.0026	57.50	0.0025
WHF-10-2		58.71		56.17	
WHF-9-1	460	59.83	0.0027	57.21	0.0024
WHF-10-1		58.61		56.11	
WHF-9-2	842	61.04	0.0028	58.38	0.0026
WHF-10-2		58.71		56.17	
See note at end of table.					

Table 3-2 (Continued)
Summary of Horizontal Hydraulic Gradients

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting Field, Milton, Florida

Well Designation	Distance Between Wells (feet)	September 30 to October 1, 1993		February 8 and 9, 1994	
		Water Level (msl)	Horizontal Gradient (ft/ft)	Water Level (msl)	Horizontal Gradient (ft/ft)
Southeast Disposal Area (continued)					
WHF-11-3	1,381	55.28	0.0029	52.97	0.0029
WHF-13-2		51.25		49.01	
WHF-11-2	1,123	54.62	0.0031	52.19	0.0029
WHF-14-1		51.20		48.90	
WHF-9-2	3,547	61.04	0.0029	58.38	0.0028
WHF-14-2		50.65		48.35	
		Average gradient	0.0028		0.0026
Industrial Area					
WHF-32-5	189	73.55	0.0031	72.21	0.0030
WHF-32-1		72.96		71.64	
WHF-29-5	237	69.99	0.0160	69.33	0.0158
WHF-29-4		66.25		65.59	
WHF-30-5	509	58.17	0.0005	56.46	0.0002
WHF-30-3		57.94		56.35	
WHF-33-5	219	63.80	0.0016	61.99	0.0018
WHF-33-4		63.45		61.60	
WHF-33-4	401	63.45	0.0044	61.60	0.0043
WHF-6-1S		61.70		59.89	
WHF-5-10S	1,506	63.83	0.0018	62.08	0.0024
WHF-29-1		66.47		65.76	
		Average gradient	0.0046		0.0046
Installation					
WHF-BKG-1	12,356	87.00	0.0039	85.70	0.0039
WHF-16-3S		38.21		38.12	
WHF-3-7S	6,105	69.47	0.0049	68.38	0.0048
WHF-16-4S		39.30		39.05	
Notes: msl = mean sea level. ft/ft = feet per foot.					

Table 3-3
Summary of Vertical Hydraulic Gradients

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Well Number	Bottom of Well Elevation (msl)	Vertical Distance Between Screens (feet)	September 30 and October 1, 1993			February 8 and 9, 1994		
			Groundwater Elevation (msl)	Vertical Gradient (ft/ft)	Vertical Flow Direction	Groundwater Elevation (msl)	Vertical Gradient (ft/ft)	Vertical Flow Direction
Northwest Disposal and Crash Crew Training Areas								
WHF-1-1S	67.68	48.06	78.68	0.0158	Downward	77.24	0.0129	Downward
WHF-1-1	19.62		77.92			76.62		
WHF-17-1S	79.46	43.75	83.67	0.0013	Downward	82.36	0.0009	Downward
WHF-17-1	35.71		83.61			82.32		
Southwest Disposal Area								
WHF-15-2S	26.68	79.73	40.58	0.0031	Downward	40.15	0.0041	Downward
WHF-15-2D	-53.05		40.33			39.82		
WHF-15-3S	31.35	81.39	43.36	0.0023	Upward	41.62	0.0140	Upward
WHF-15-3D	-50.04		43.55			42.76		
WHF-15-6S	30.56	78.84	39.89	0.0027	Downward	38.68	0.0226	Upward
WHF-15-6D	-48.28		39.68			40.46		
WHF-16-2S	33.85	83.39	44.75	0.0041	Downward	43.93	0.0026	Downward
WHF-16-2I	-49.54		44.41			43.71		
WHF-16-3S	28.44	95.12	38.21	0.0319	Upward	38.12	0.0291	Upward
WHF-16-3D	-66.68		41.24			40.89		
WHF-16-4S	32.41	102.08	39.3	0.0042	Downward	39.05	0.0041	Downward
WHF-16-4D	-69.67		38.87			38.63		

Table 3-3 (Continued)
Summary of Vertical Hydraulic Gradients

**Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida**

Well Number	Bottom of Well Elevation (msl)	Vertical Distance Between Well Screens (feet)	September 30 and October 1, 1993			February 8 and 9, 1994		
			Groundwater Elevation (msl)	Vertical Gradient (ft/ft)	Vertical Flow Direction	Groundwater Elevation (msl)	Vertical Gradient (ft/ft)	Vertical Flow Direction
Southeast Disposal Area								
WHF-14-2	27.5	41.01	50.65	0.0134	Upward	48.35	0.0134	Upward
WHF-14-1	-13.51		51.20			48.90		
Industrial Area								
WHF-3-1S	49.75	57.07	69.34	0.0032	Downward	68.19	0.0026	Downward
WHF-3-1D	-7.32		69.16			68.04		
WHF-3-2S	58.66	55.63	71.41	0.0315	Downward	70.47	0.0363	Downward
WHF-3-2D	3.03		69.66			68.45		
WHF-3-3S	64.43	69.31	72.17	0.0486	Downward	70.81	0.0466	Downward
WHF-3-3D	-4.88		68.80			67.58		
WHF-3-7S	49.47	56.72	69.47	0.0007	Downward	68.38	0.0026	Upward
WHF-3-7D	-7.25		69.43			68.53		
WHF-5-8S	49.29	45.61	66.53	0.0145	Downward	64.97	0.0184	Downward
WHF-5-8D	3.68		65.87			64.13		
WHF-5-9S	46.81	50.96	64.53	0.0006	Downward	62.72	0.0007	Upward
WHF-5-9D	-4.15		64.50			62.76		
WHF-5-10S	39.4	38.40	63.83	0.0060	Downward	62.08	0.0039	Downward
WHF-5-10D	1		63.60			61.93		
WHF-6-1S	43.3	46.22	61.70	0.0009	Upward	59.89	0.0011	Upward
WHF-6-1D	-2.92		61.74			59.94		

Table 3-4
Summary of Hydraulic Conductivity (K) Data from Slug Tests

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting, Milton, Florida

Well Number	Range of K (ft/day)	Number of Usable Runs	Average K (ft/min)	Average K (ft/day)	Average K (cm/sec)
SHALLOW/INTERMEDIATE MONITORING WELLS					
WHF-BKG-2	R	R		-	-
<u>Site 1, Northwest Disposal Area</u>					
WHF-1-1S	18.09 to 20.33	3	0.0135	19.47	6.87×10^{-3}
<u>Site 2, Northwest Open Disposal Area</u>					
WHF-2-1	16.79 to 20.35	3	0.0133	19.14	6.75×10^{-3}
<u>Site 17, Crash Crew Training Area</u>					
WHF-17-2	3.67 to 4.50	2	0.0028	4.01	1.42×10^{-3}
<u>Site 18, Crash Crew Training Area</u>					
WHF-18-2	R	R	R	R	R
			Geometric Mean	11.43	4.03×10^{-3}
<u>Southwest Disposal Area</u>					
<u>Site 15, Southwest Landfill</u>					
WHF-15-2S	6.66 to 6.86	3	0.0047	6.75	2.38×10^{-3}
WHF-15-2I	25.99 to 28.87	4	0.0194	27.91	9.85×10^{-3}
WHF-15-3S	8.88 to 8.95	2	0.0062	8.93	3.15×10^{-3}
WHF-15-3I	20.29 to 23.44	4	0.0153	22.08	7.79×10^{-3}
WHF-15-6S	3.50 to 3.80	3	0.0026	3.67	1.29×10^{-3}
<u>Site 16, Open Disposal and Burning Area</u>					
WHF-16-2S	27.20 to 30.96	4	0.0200	28.82	1.02×10^{-2}
WHF-16-2I	9.19 to 10.39	4	0.0068	9.73	3.43×10^{-3}
WHF-16-3S	3.99 to 4.56	3	0.0030	4.29	1.52×10^{-2}
WHF-16-3I	4.92 to 5.28	5	0.0035	5.07	1.79×10^{-3}
WHF-16-3II	43.98 to 49.10	3	0.0323	46.49	1.64×10^{-2}
			Geometric Mean	11.45	4.04×10^{-3}
<u>Southeast Disposal Area</u>					
<u>Site 10, Southeast Open Disposal Area (A)</u>					
WHF-10-2	R	R	R	R	R
<u>Site 11, Southeast Open Disposal Area (B)</u>					
WHF-11-2	R	R	R	R	R
WHF-11-3	4.41 to 5.23	3	0.0033	4.73	1.67×10^{-3}
<u>Site 13, Sanitary Landfill</u>					
WHF-13-2S	13.23 to 15.51	6	0.0101	14.55	5.13×10^{-3}
<u>Site 14, Short-Term Sanitary Landfill</u>					
WHF-14-2	8.53 to 8.57	2	0.0059	8.55	3.02×10^{-3}
			Geometric Mean	8.38	2.96×10^{-3}
See notes at end of table.					

Table 3-4 (Continued)
Summary of Hydraulic Conductivity (K) Data from Slug Tests

Technical Memorandum No. 4
 Hydrogeologic Assessment
 NAS Whiting, Milton, Florida

Well Designation	Range of K (ft/day)	Number of Usable Runs	Average K (ft/min)	Average K (ft/day)	Average K (cm/sec)
SHALLOW/INTERMEDIATE MONITORING WELLS (Continued)					
Industrial Area					
<u>Site 3, Underground Waste Solvent Storage Area</u>					
WHF-3-3S	0.86 to 0.93	3	0.0006	0.89	3.15×10^{-4}
WHF-3-7S	2.98 to 3.23	3	0.0022	3.10	1.11×10^{-3}
<u>Site 5, Battery Acid Seepage Pit</u>					
WHF-5-8S	4.72 to 5.81	2	0.0037	5.26	1.86×10^{-3}
WHF-5-10S	27.98 to 35.17	3	0.0216	31.16	1.10×10^{-2}
<u>Site 6, South Transformer Oil Disposal Area</u>					
WHF-6-1S	0.34 to 0.38	3	0.0003	0.35	1.24×10^{-4}
<u>Site 29, Auto Hobby Shop</u>					
WHF-29-1	R	R	--	--	--
WHF-29-5	10.55 to 10.56	2	0.0073	10.56	3.73×10^{-3}
<u>Site 30, Southfield Maintenance Hangar Area</u>					
WHF-30-3	0.58 to 0.67	2	0.0004	0.63	2.24×10^{-4}
WHF-30-5	19.22 to 19.64	2	0.0135	19.44	6.86×10^{-3}
<u>Site 32, Northfield Maintenance Hangar Area</u>					
WHF-32-5	7.43 to 7.76	3	0.0053	7.60	2.68×10^{-3}
<u>Site 33, Midfield Maintenance Hangar Area</u>					
WHF-33-3	5.61 to 6.63	3	0.0043	6.19	2.18×10^{-3}
WHF-33-5	14.12 to 14.50	3	0.0099	14.28	5.01×10^{-3}
			Geometric Mean	4.47	1.58×10^{-3}
DEEP MONITORING WELLS					
Southwest Disposal Area					
<u>Site 15, Southwest Landfill</u>					
WHF-15-2D	0.70 to 0.77	3	0.0005	0.73	2.59×10^{-4}
WHF-15-3D	5.59 to 5.75	3	0.0039	5.66	2.00×10^{-3}
<u>Site 16, Open Disposal and Burning Area</u>					
WHF-16-3D	0.27 to 0.30	3	0.0002	0.28	9.01×10^{-5}
			Geometric Mean	1.05	3.70×10^{-4}
Industrial Area					
<u>Site 3, Underground Waste Solvent Storage Area</u>					
WHF-3-3D	2.88 to 3.18	4	0.0021	2.97	1.05×10^{-3}
WHF-3-7D	41.24 to 41.67	2	0.0288	41.46	1.46×10^{-2}
<u>Site 5, Battery Acid Seepage Pit</u>					
WHF-5-8D	0.32 to 0.31	2	0.0002	0.32	1.12×10^{-4}
WHF-5-10D	18.09 to 21.64	4	0.0141	20.32	7.17×10^{-3}
<u>Site 6, South Transformer Oil Disposal Area</u>					
WHF-6-1D	15.45 to 17.29	4	0.0116	16.66	5.88×10^{-4}
			Geometric Mean	6.67	2.35×10^{-3}
Notes: Average is the arithmetic average.					
ft/day = feet per day.			cm/sec = centimeters per second.		
ft/min = feet per minute.			R = data rejected.		

Table 3-5
Summary of Phase IIA Seepage Velocities

Technical Memorandum No. 4
Hydrogeologic Assessment
NAS Whiting Field, Milton, Florida

Investigation Area	Sites	Monitoring Well Pair	Horizontal ¹ Gradient (ft/ft)	K (ft/day)	Effective Porosity (n)	Seepage Velocity (ft/day)
Northwest Disposal and Crash Crew Training Area	1	WHF-1-1S and WHF-1-2	0.0041	19.47	0.35	0.23
	1 and 2	WHF-1-1S and WHF-2-1	0.0047	19.14	0.35	0.26
	17	WHF-17-1S and WHF-17-2	0.0017	4.01	0.35	0.02
Arithmetic average						0.17
Southwest Disposal Area	15	WHF-15-2S and WHF-15-3S	0.0028	² 7.84	0.35	0.06
	16	WHF-16-2S and WHF-16-3S	0.0055	² 16.56	0.35	0.56
Arithmetic average						0.31
Southeast Disposal Area	11 and 13	WHF-11-3 and WHF-13-2	0.0029	² 9.65	0.35	0.08
	9, 10, 11, 13, and 14	WHF-9-2 and WHF-14-2	0.0029	³ 8.37	0.35	0.07
	Arithmetic average						0.075
Industrial Area	5	WHF-5-8S and WHF-5-OW	0.0030	5.26	0.35	0.05
	6	WHF-33-4 and WHF-6-1S	0.0043	0.35	0.35	0.004
	29	WHF-29-4 and WHF-29-5	0.0158	10.56	0.35	0.48
	30	WHF-30-3 and WHF-30-5	0.0002	10.04	0.35	0.006
	33	WHF-33-4 and WHF-33-5	0.0018	14.28	0.35	0.07
	32	WHF-32-1 and WHF-32-5	0.0030	7.60	0.35	0.07
Arithmetic Average						0.11

¹ Horizontal gradients based on February 8 and 9, 1994, groundwater measurements.

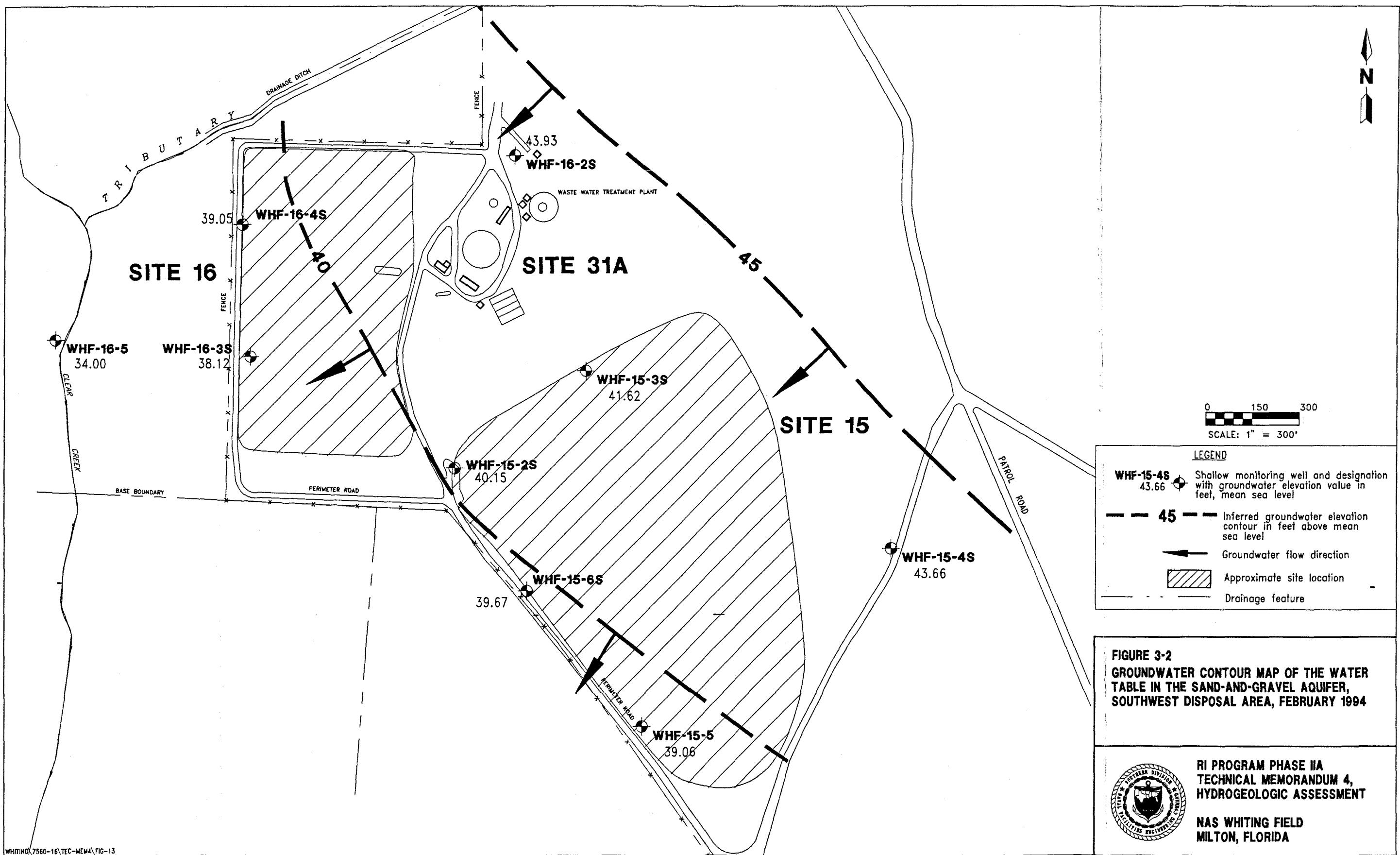
² The K is averaged where values are available for both wells in the well pair.

³ Geometric mean for the area.

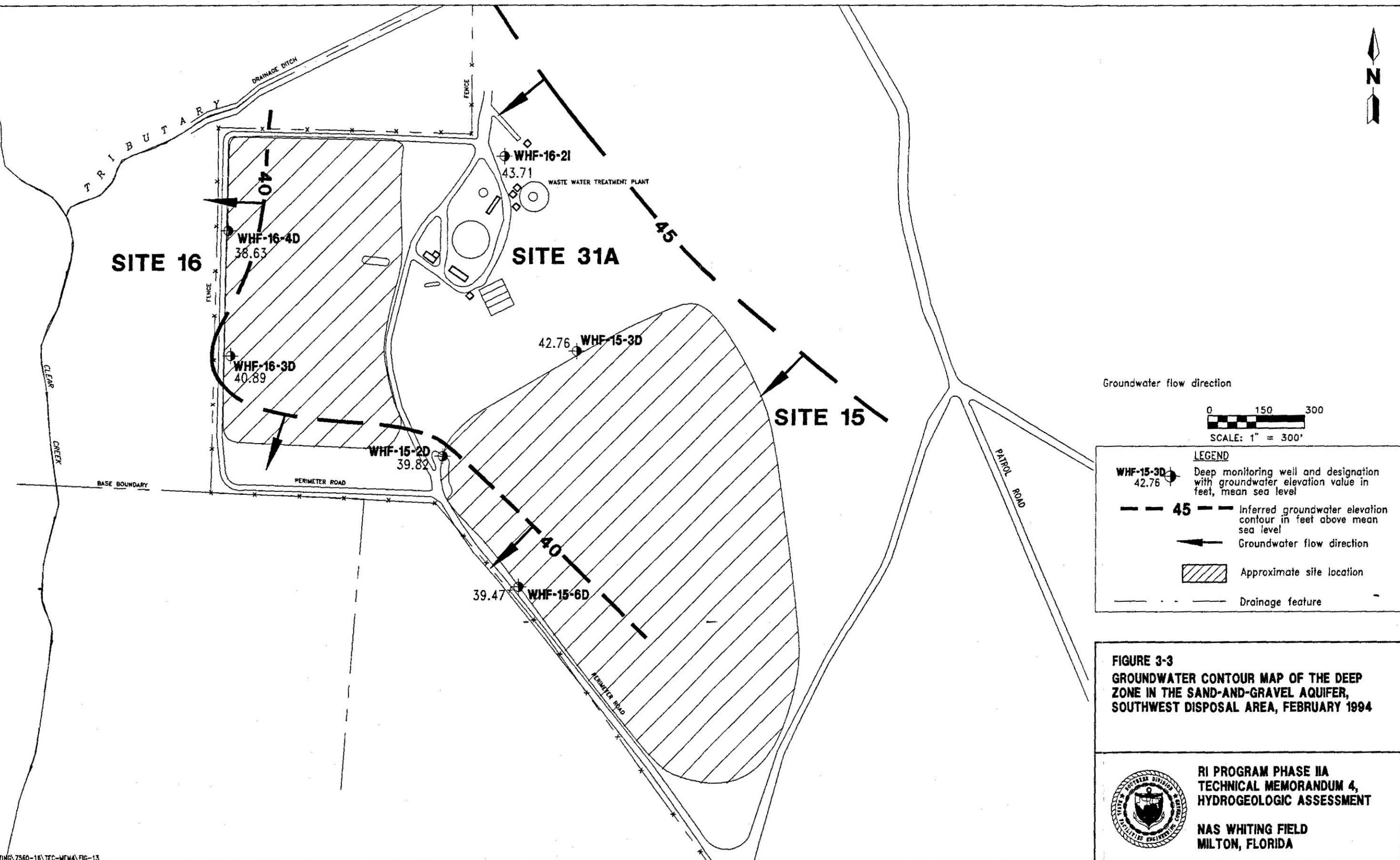
Notes: ft/ft = feet per foot.

K is hydraulic conductivity (ft/day).

ft/day = feet per day.



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event are provided in Appendix C. Data from both measurement events indicate that flow in both the shallow and deep flow zones is in a southwest direction.

Horizontal and Vertical Gradients. Table 3-2 provides a summary of the horizontal hydraulic gradients calculated for the Southwest Disposal Area. The horizontal hydraulic gradient for the shallow monitoring wells ranged from 0.0028 (between WHF-15-3S and WHF-15-2S, event 2) to 0.0062 ft/ft (WHF-16-2S and WHF-16-3S, event 1). Average horizontal hydraulic gradients for the first and second measurement events were 0.0056 ft/ft and 0.0043 ft/ft, respectively. It should be noted that the horizontal hydraulic gradient reported between wells WHF-16-2S and WHF-16-3S and WHF-15-4S and WHF-15-5S remained relatively unchanged between measurement events; however, the horizontal hydraulic gradient reported between wells WHF-15-3S and WHF-15-2S indicated an approximate 50 percent decrease.

Table 3-3 presents a summary of the vertical hydraulic gradients calculated for the Southwest Disposal Area. The vertical hydraulic gradients were calculated using six well pairs in the area. The vertical hydraulic gradients for the Southwest Disposal Area ranged from 0.0023 at well nest WHF-15-3 to 0.0319 ft/ft at well nest WHF-16-3. Two of the Site 15 well clusters, WHF-15-3 and WHF-15-6, had order of magnitude variations in the vertical hydraulic gradient between measurement events. Both upward and downward vertical hydraulic gradients were observed in different well pairs at Sites 15 and 16. Reversal of the vertical hydraulic gradient from downward to upward occurred between measurement events in monitoring well nest WHF-15-6.

Hydraulic Conductivity and Seepage Velocity. Table 3-4 summarizes the hydraulic conductivity calculations for monitoring wells in the Southwest Disposal Area. Five shallow monitoring wells, five intermediate monitoring wells, and two deep monitoring wells were selected for slug test analyses. Hydraulic conductivities at the Southwest Disposal Area varied from 3.67 ft/day (1.29×10^{-3} cm/sec) at WHF-15-6S to 46.49 ft/day (1.64×10^{-2} cm/sec) at WHF-16-3II. The geometric mean hydraulic conductivity for the Southwest Disposal Area was 11.43 ft/day (4.03×10^{-3} cm/sec) for the shallow and intermediate monitoring wells. The hydraulic conductivities of the deep wells ranged from 0.28 ft/day (9.81×10^{-5} cm/sec) to 5.66 ft/day (2.00×10^{-3} cm/sec) at WHF-16-3D and WHF-15-3D, respectively. The geometric mean for the deep wells was 1.05 ft/day (3.70×10^{-4} cm/sec).

The shallow and intermediate monitoring wells were screened within poorly graded sands between 39 feet below and 48 feet above mean sea level (msl), whereas the lithologies of sediments adjacent to the deep monitoring well screens varied from silt/sand/clay mixtures to poorly graded sand (between 66 and 40 feet below msl). The lithology of sediments adjacent to the screened interval of shallow and intermediate monitoring well lithologies were generally one to two orders of magnitude more conductive than those around the deep monitoring wells (comparing K values for wells within the same well clusters).

Seepage Velocity. Table 3-5 provides a summary of the calculated seepage velocities for the water table zone of the surficial aquifer for the sites in the Southwest Disposal Area. The seepage velocity calculated for Site 15 was 0.06 ft/day. This value was approximately an order of magnitude lower than the value calculated at Site 16 (0.56 ft/day). The average seepage velocity value for both Sites 15 and 16 was 0.31 ft/day.

3.1.3 Southeast Disposal Area The Southeast Disposal Area encompasses Sites 9, 10, 11, 12, 13, and 14 (Figure 3-4). The hydrogeologic assessment of the area included: collecting water level data from seven Phase IIA RI monitoring wells, two Phase I wells, and six wells constructed during the Verification Study (Geraghty & Miller, 1986) and conducting slug tests on five monitoring wells.

Groundwater Flow Direction. Table 3-1 summarizes the results of the water level measurements recorded during the Phase IIA RI field program. The shallow groundwater flow directions were calculated for each of the two groundwater measurement events. The data from both measurement events indicated a groundwater flow direction to the southeast. Because groundwater flow patterns between the two measurement events were similar, only a map of the February 8 and 9, 1994, event (Figure 3-1) is included in the body of this report. A shallow zone groundwater contour map of the September 30 and October 1, 1993, measurement event is provided in Appendix C.

Monitoring well WHF-11-1S was determined to contain a water level outside the typical range reported in the other nearby wells (Figure 3-4). A review of the lithologic log for the monitoring well indicated the well may be completed into a perched groundwater zone isolated from the water zone in which other nearby wells are completed.

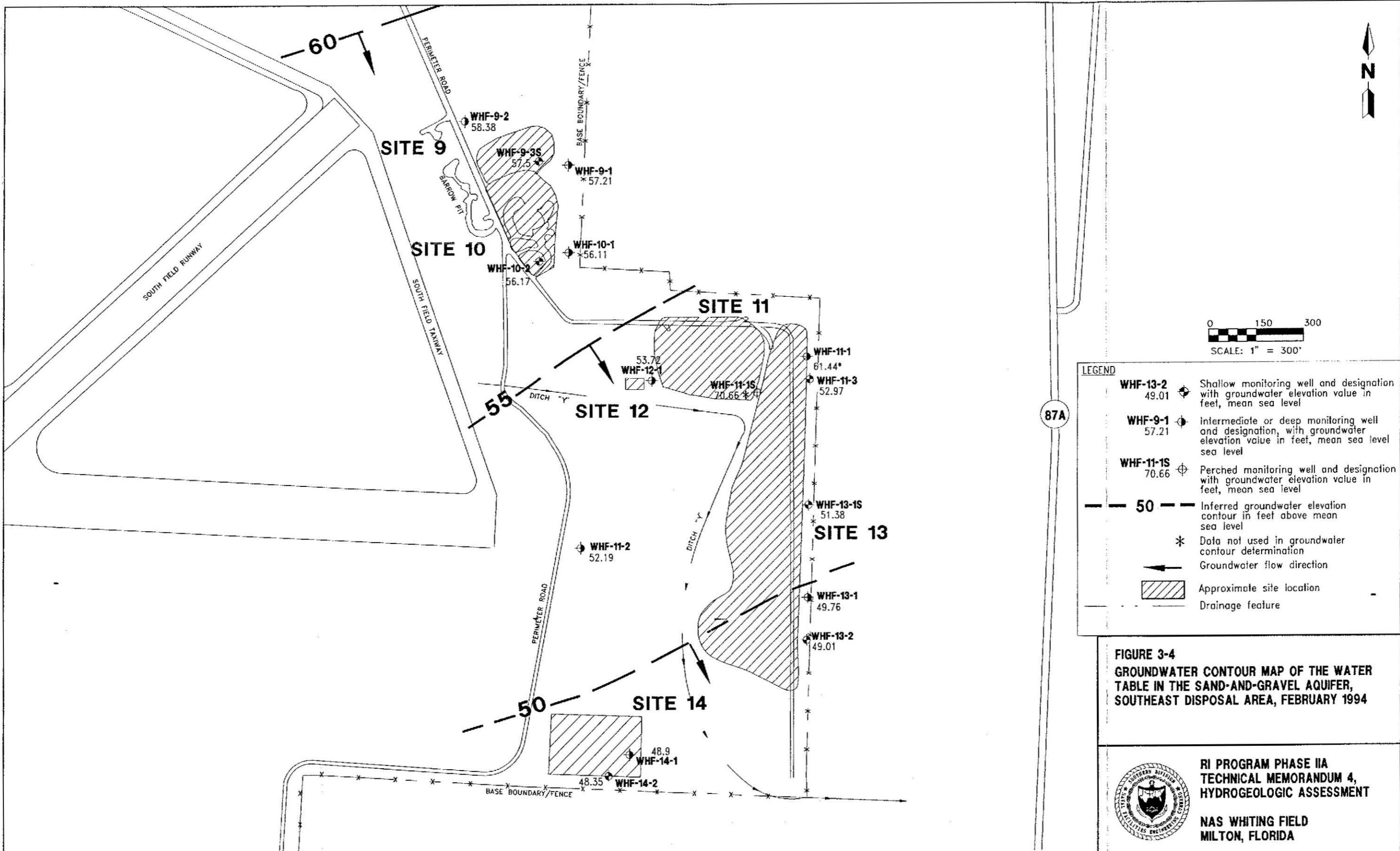
Three monitoring wells (WHF-11-1, WHF-13-1, and WHF-14-1) were completed at depths generally 10 to 20 feet deeper than the shallow zone monitoring wells (Table 3-1). Data from these three wells suggests a groundwater flow pattern to the southeast, similar to the flow pattern for the shallow water table zone. Similar results were reported for the September 30 and October 1, 1993, water level measurement event (Appendix C).

Horizontal and Vertical Flow Gradients. Table 3-2 summarizes the horizontal hydraulic gradient calculated for the Southeast Disposal Area. The horizontal hydraulic gradients ranged from 0.0031 ft/ft (monitoring well WHF-3-2) to 0.0024 ft/ft (monitoring well WHF-9-1). All reported values were within the same order of magnitude. The average horizontal hydraulic gradients for the September 30 and October 1, 1993, and February 8 and 9, 1994, sampling events were 0.0028 ft/ft and 0.0026 ft/ft, respectively.

Table 3-3 summarizes the results for the vertical hydraulic gradients reported in the Southeast Disposal Area. Because of the limited number of intermediate monitoring wells in the area and the absence of nested well pairs, the vertical hydraulic gradient was calculated for a single set of wells: WHF-14-1 and WHF-14-2. The vertical hydraulic gradient was upward for both the September 30 and October 1, 1993, and the February 8 and 9, 1994, sampling events and was 0.0134 ft/ft.

Hydraulic Conductivity. Table 3-4 summarizes the hydraulic conductivity values calculated for monitoring wells in the Southeast Disposal Area. Five shallow monitoring wells were selected for slug testing. All slug test trials completed on monitoring well WHF-11-2 proved to be unusable and were rejected (Table 2-2). In addition, data from monitoring well WHF-10-2 were rejected because they exceeded the 20 percent variance criteria (ABB-ES, 1994d).

Hydraulic conductivities from this site grouping varied from 4.73 ft/day (1.67×10^{-3} cm/sec) in monitoring well WHF-11-3 to 14.55 ft/day (5.13×10^{-3} cm/sec)



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in monitoring well WHF-13-2S. The geometric mean for the hydraulic conductivity of monitoring wells in the area was 8.38 ft/day (2.96×10^{-3} cm/sec). Monitoring wells selected from the Southeast Disposal Area were screened within well graded to poorly graded sands between 27 to 59 feet above msl.

Seepage Velocity. Table 3-5 presents the calculated seepage velocities for the water table zone for the Southeast Disposal Area sites. Seepage velocity calculations were completed for monitoring wells WHF-11-3 and WHF-13-2 and WHF-9-2 and WHF-14-2. The average of the seepage velocity values calculated for Sites 11 and 13 and Sites 9, 10, 11, 13, and 14 was 0.075 ft/day.

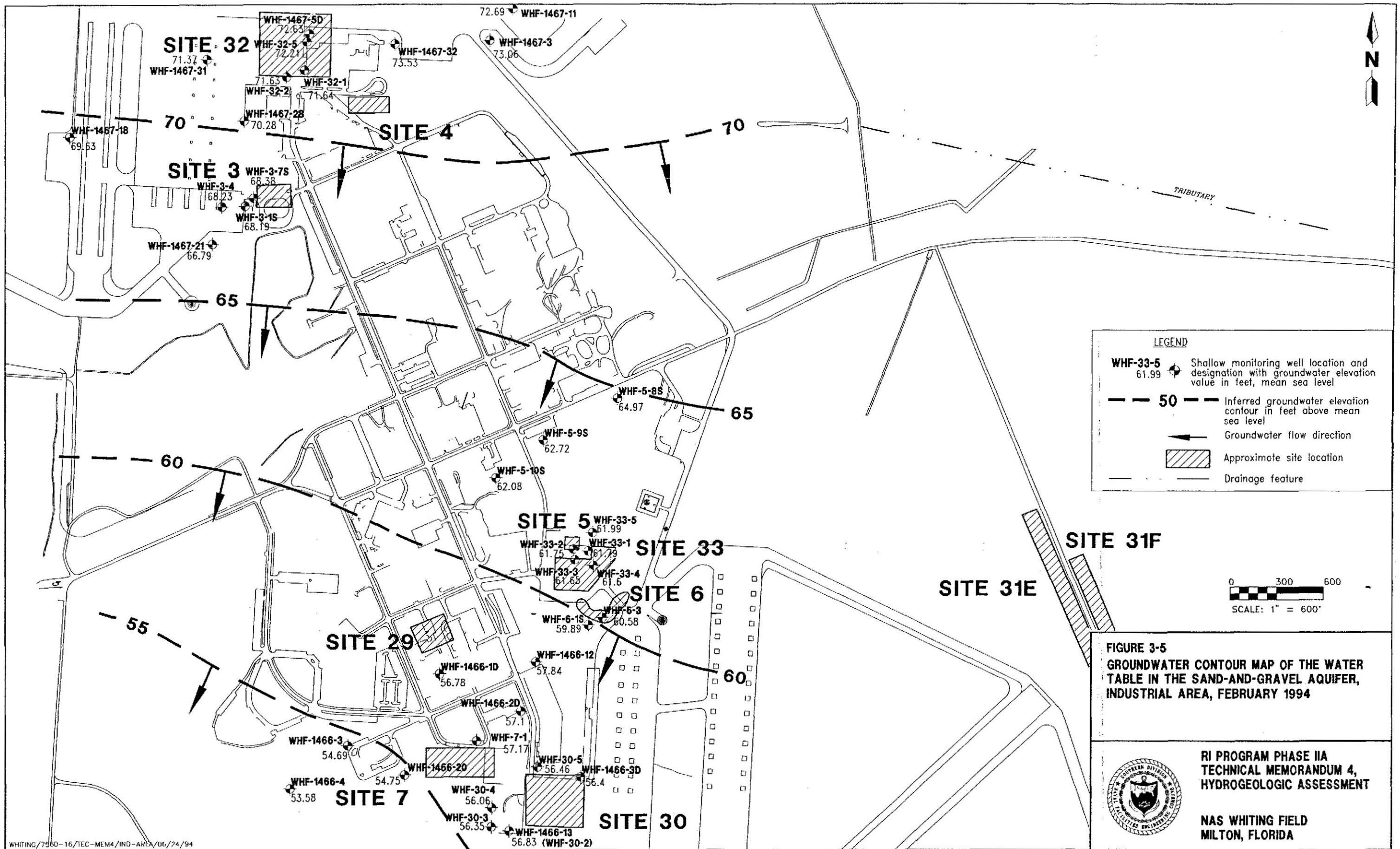
3.1.4 Industrial Area The Industrial Area encompasses Sites 3, 4, 5, 6, 7, 8, 29, 30, 32, and 33 (see Table 1-1 for site names). The hydrogeologic assessment of the area included: collecting water level data from 37 Phase IIA RI monitoring wells, 49 wells installed under the UST program, 5 RI Phase I wells, and 6 wells constructed during the Verification Study (Geraghty & Miller, 1986), and conducting slug tests on 16 monitoring wells.

Groundwater Flow Direction Table 3-1 provides a summary of the water level measurements recorded in the Industrial Area. Shallow, intermediate, and deep groundwater flow patterns were determined based on the water level data. Figures 3-5 and 3-6 provide a graphic representation for the shallow and deep flow zones, respectively, collected during the February 8 and 9, 1994, water level measurement event. Groundwater flow contour maps were also completed for the September 30 and October 1, 1993, measurement event. Both shallow and deep zone groundwater maps showed similar flow patterns to the February 1994 flow maps. The 1993 maps are included in Appendix C. Because of the limited number of intermediate zone monitoring wells, the flow direction was not determined for this interval. However, comparison of the intermediate and deep groundwater evaluation data suggests that the flow direction for the intermediate zone is similar to the deep zone.

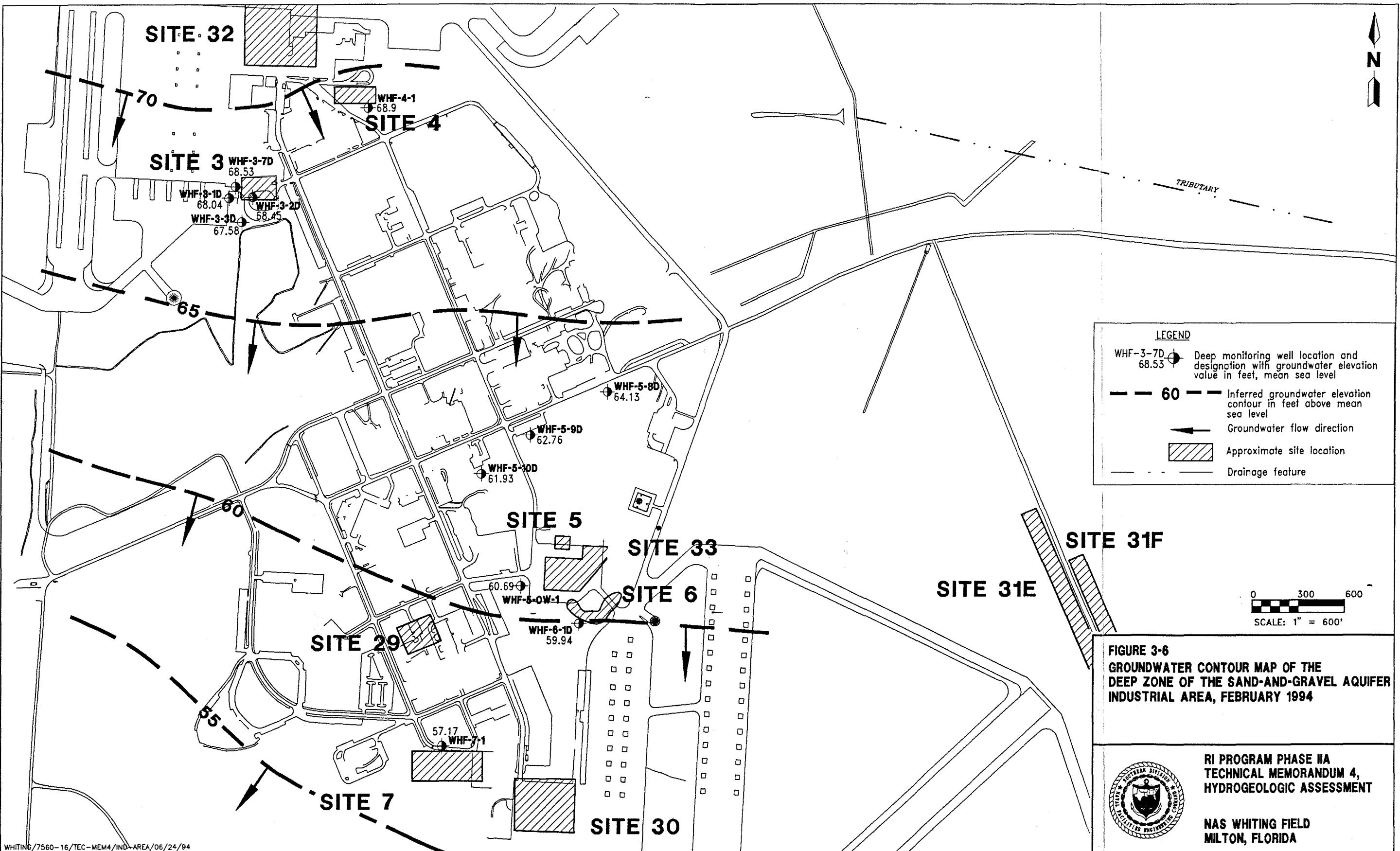
A review of the groundwater flow data indicated a perched groundwater flow zone, which corresponds with previously identified clay layers within the Industrial Area. A comparison of groundwater elevations with lithologic logs for individual monitoring wells indicated potential perched groundwater conditions at Sites 3 and 4 (UST Site 1467), Site 7 (UST Site 1466), and Site 29 (automotive hobby shop). Figure 3-7 shows the interpreted groundwater contours for the perched zone within the Industrial Area.

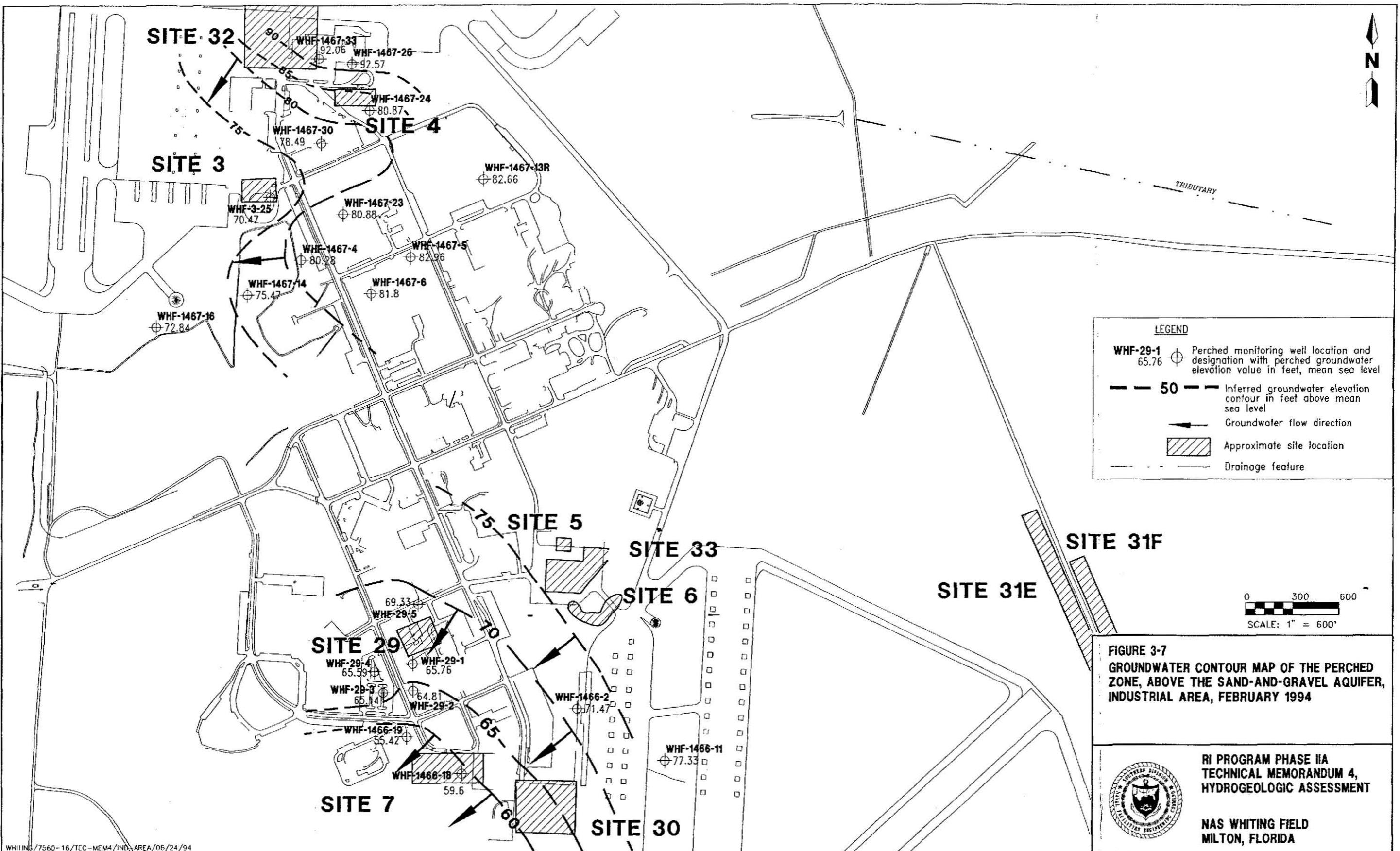
The variation in water levels between identified perched monitoring wells and monitoring wells screened across the water table ranged from 2.31 feet at Site 3 (monitoring well WHF-3-2) to 8.98 feet at Site 29. The greatest difference in water level elevations occurred north of Site 4 (UST Site 1467) in UST wells WHF-1467-6D and WHF-1467-26, where the water levels varied by 17.61 feet (both well locations are shown on Figure 2-1). Interpretation of the perched groundwater potentiometric surface suggests more irregular flow pattern than the shallow (Figure 3-5) or deep (Figure 3-6) flow zones. The irregular flow pattern is probably a result of influence by the surface of the clay layer upon which it resides.

As indicated on Figures 3-5 and 3-6, both shallow and deep groundwater flow throughout most of the Industrial Area flows to the south and southwest.



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Horizontal and Vertical Gradients. Table 3-2 summarizes the horizontal hydraulic gradient values calculated for monitoring wells in the Industrial Area. Horizontal hydraulic gradients in this area varied over one order of magnitude. Values ranged from 0.016 ft/ft (monitoring wells WHF-29-5 and WHF-29-4) to 0.0002 ft/ft (monitoring wells WHF-30-5 and WHF-30-3). The average horizontal hydraulic gradient for the Industrial Area is the same (0.0046 ft/ft) for both measurement events.

Table 3-3 summarizes the calculated vertical hydraulic gradients for the Industrial Area. The vertical hydraulic gradients varied by up to two orders of magnitude from 0.0486 ft/ft at Site 3 well nest WHF-3-3 to 0.0006 at Site 5 well nest WHF-5-9. The direction of the vertical hydraulic gradient was predominantly downward. However, an upward hydraulic gradient occurred at one well cluster (WHF-6-1) at Site 6 and two well nests (WHF-3-7 and WHF-5-9) indicated a reversal of flow direction from downward to upward between the groundwater elevation measurement events.

Hydraulic Conductivity and Seepage Velocity. Twelve shallow and five deep monitoring wells were selected for slug testing. From a total of 59 slug test trials performed on the wells, 45 were deemed usable (Table 2-2). The data from WHF-29-1 were rejected because they were not representative of the hydraulic conductivity values from the observed screen lithology.

Table 3-4 presents the hydraulic conductivity values calculated for the sites within the Industrial Area. Hydraulic conductivities for the shallow and intermediate monitoring wells varied from 31.16 ft/day (1.10×10^{-2} cm/sec) at Site 5 to 0.35 ft/day (1.24×10^{-4} cm/sec) at Site 6 (South Transformer Oil Disposal Area). The geometric mean across the Industrial Area was 4.48 ft/day (1.57×10^{-3} cm/sec) for the shallow and intermediate depth monitoring wells. For the deep monitoring wells, hydraulic conductivities ranged from 41.46 (1.46×10^{-2} cm/sec) (WHF-3-7D) ft/day to 0.32 (1.12×10^{-4} cm/sec) (WHF-5-8D). The geometric mean for the deep wells was 6.67 ft/day (2.35×10^{-3} cm/sec).

The shallow and intermediate monitoring well screen elevations ranged from 2 feet below to 77 feet above msl. The sediments in this depth range varied from poorly graded sands to clayey/silty sands. The deep monitoring well screen elevations range from 12 feet below to 11 feet above msl. The lithologies in this depth range varied from well graded to poorly graded, dense sands.

Seepage Velocity. Table 3-5 provides a summary of the seepage velocities values calculated for the water table flow zone in the Industrial Area. The calculated seepage velocity value for the Industrial Area ranged from 0.48 ft/day at Site 29 to 0.004 ft/day at Site 6. The average of the seepage velocity values for the Industrial Area was 0.11 ft/day.

3.2 INSTALLATION-WIDE HYDROGEOLOGIC CONDITIONS. The following section presents a summary of the groundwater flow directions, hydraulic conductivity values, and vertical and horizontal gradients presented in the previous sections. Data were averaged across the installation and ranges of values are discussed to depict hydrogeologic conditions for the entire installation.

Groundwater Flow Direction. Shallow and deep zone groundwater flow directions were determined using data from two water level elevation measurement events

(Table 3-1). Perched groundwater was encountered only in the Industrial Area and at one location in the Southeast Disposal Area and is discussed in Subsection 3.1.3. Figures 3-8 and 3-9 illustrate installation-wide groundwater contours for the shallow and deep zones, respectively, based on the February 8 and 9, 1994, water level measurement event. Interpretation of these figures suggest that groundwater flows primarily in a south to southwesterly direction in the western part of the facility. In addition, a lesser flow component to the southeast may be present in the southeast part of the facility. Clear Creek, located west of the facility, appears to be a discharge area for groundwater. Shallow and deep groundwater flow contours for the September 30 and October 1, 1993, water level measurement event are presented in Appendix C.

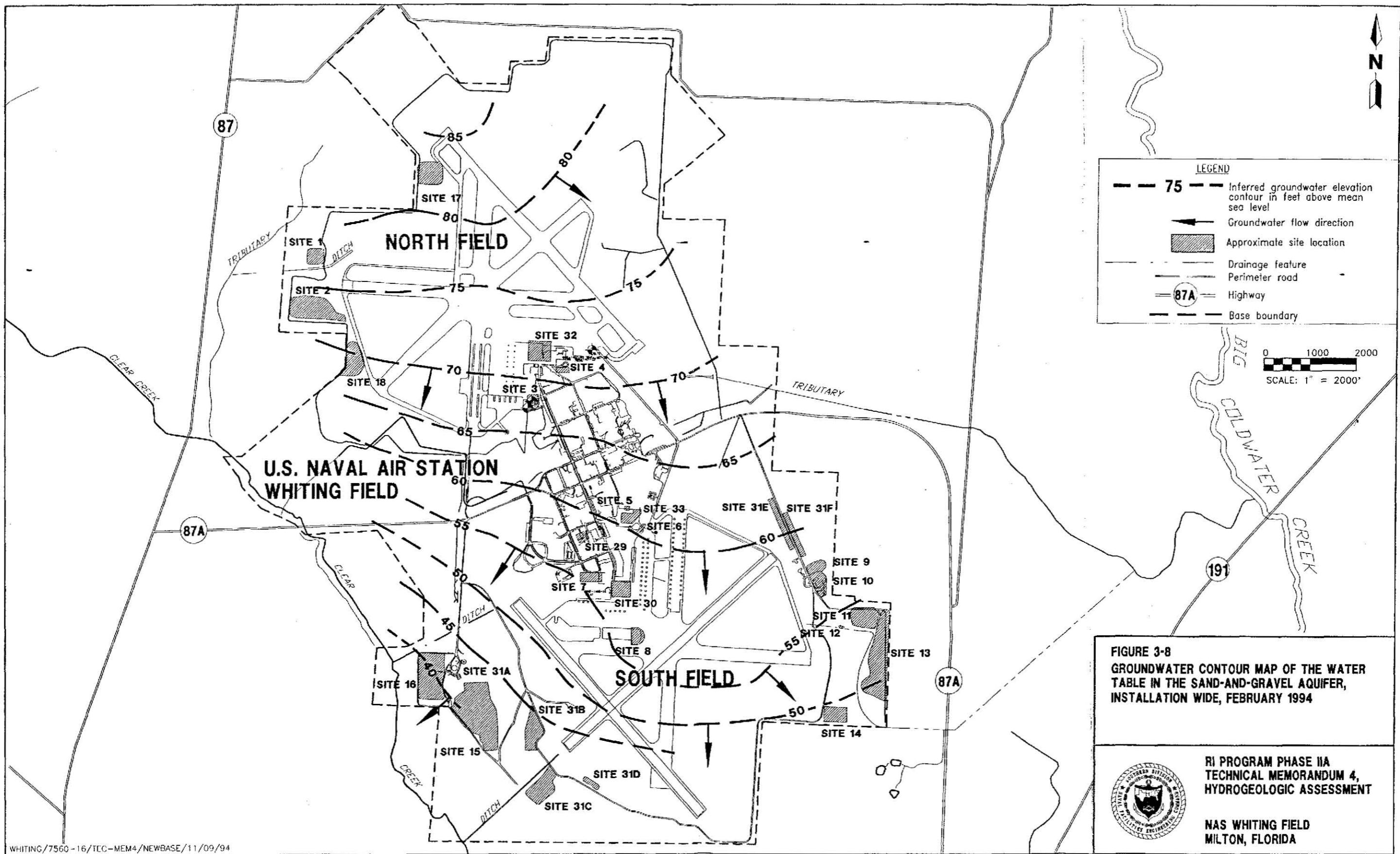
Horizontal and Vertical Gradients. Table 3-2 summarizes the horizontal hydraulic gradients calculated for various sites at the installation. Estimated horizontal hydraulic gradients across the installation range from 0.0039 ft/ft to 0.0048 ft/ft. With the exception of Sites 29 and 30, horizontal hydraulic gradients for all other sites were within the same order of magnitude. The values at Site 30 were one order of magnitude lower than this range, and the values at Site 29 were one order of magnitude higher. A comparison of the calculated values (Table 3-2) between measurement events indicated similar values.

Table 3-3 provides a summary of the vertical hydraulic gradients calculated for each of the sites at the installation. The vertical hydraulic gradients across the installation range from 0.0486 at Site 3 to 0.0006 ft/ft at Site 5. The direction of flow was predominantly in the downward vertical direction. However, upward flow was observed in six well clusters (Sites 5, 6, 14, 15, and 16). Three of these clusters (at Sites 5 and 15) exhibited a reversal of the vertical hydraulic gradients calculated for each of the individual sites.

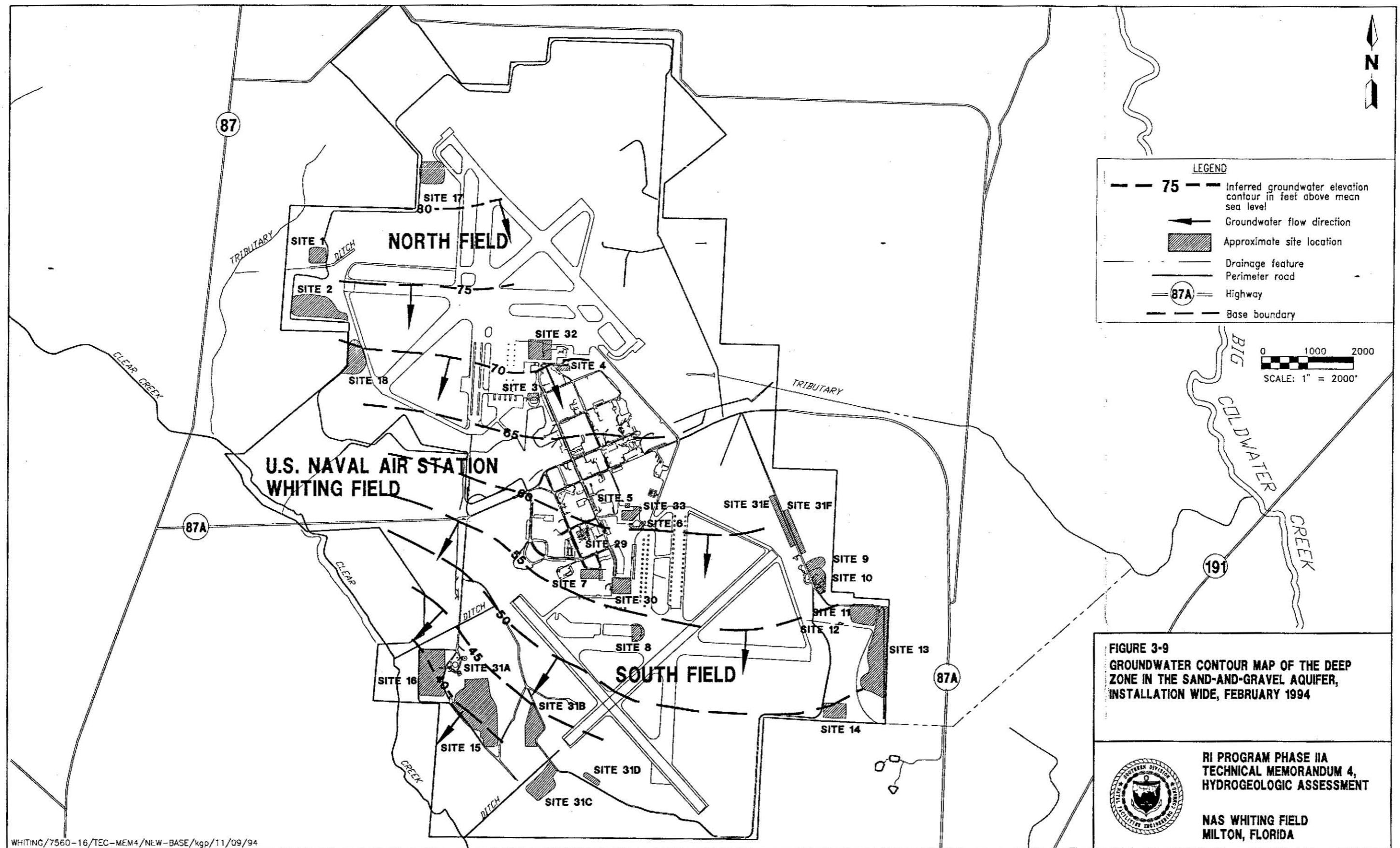
Hydraulic Conductivity and Seepage Velocity. Table 3-4 summarizes the hydraulic conductivities calculated for the various sites at the installation. The K values for individual wells ranged from 0.28 to 46.49 ft/day.

The average K value for shallow monitoring wells (typically screened within well graded to silty sands between 2.21 feet below and 83.54 feet above msl) was 7.54 ft/day (2.66×10^{-3} cm/sec). The average K values for deep monitoring wells (screened within poorly to well graded sands, and silty sands and clay mixtures between 66.36 below and 11.56 feet above msl), the average K was 3.33 ft/day (1.18×10^{-3} cm/sec). This data suggests that the hydraulic values may decrease with depth.

Seepage Velocity. Estimated seepage velocities (V_s) ranged from 0.004 ft/day at Site 6 to 0.48 ft/day at Site 29 (Table 3-5). Groundwater in the interconnected pore spaces of the sand-and-gravel aquifer flows at velocities estimated between 1.4 to 174 feet in a year depending on the particular location in the aquifer. In general, areas of most rapid groundwater flow were Sites 1, (0.23 ft/day), 2 (0.26 ft/day), 16 (0.56 ft/day), and 29 (0.48 ft/day). Seepage velocities at Sites 6 and 30 were one to two orders of magnitude slower than the other sites included in the test.



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4.0 ASSESSMENT SUMMARY

- The findings of this assessment are consistent with past descriptions of the regional hydrogeologic setting and the hydrostratigraphy of the sand-and gravel aquifer.
- Interpretations of the potentiometric surface maps for the shallow and deep zones of the upper sand-and-gravel aquifer indicate groundwater from the Northwest Disposal and Crash Crew Training Areas, Southwest Disposal Area, and a majority of the Industrial Area flows to the south and southwest towards Clear Creek. An additional flow component to the southeast may be present in the southeastern portion of the facility.
- The horizontal hydraulic gradient values installation wide ranged from 0.0039 ft/ft to 0.0048 ft/ft (Table 3-2). With the exception of two sites, Sites 29 and 30, all horizontal hydraulic gradient values were within an order of magnitude difference.
- Vertical hydraulic gradients are primarily in the downward direction (Table 3-5); however, upward hydraulic gradients were detected at Sites 6, 14, and 15. Reversals of hydraulic gradients were also detected at Sites 3, 5, and 15. Well pairs that exhibited the highest hydraulic gradient values include WHF-1-1 (0.0129 ft/ft) and WHF-3-3 (0.486 ft/ft).
- The hydraulic conductivity values ranged from 0.28 to 46.49 in individual wells at the facility. The geometric mean hydraulic conductivity values for each of the individual sites group areas are listed below.

<u>Site Grouping Area</u>	Average Hydraulic Conductivity Value <u>(feet per day)</u>	Average Hydraulic Conductivity Values <u>(centimeters per second)</u>
Northwest Disposal and Crash Crew Training Areas	11.43	4.03×10^{-3}
Southwest Disposal Area	11.45	4.04×10^{-3}
Southeast Disposal Area	8.38	2.96×10^{-3}
Industrial Area	4.47	1.58×10^{-3}

- Seepage velocities values facility wide varied between 0.004 ft/day (Site 6) to 0.56 ft/day (Site 16). Sites 1, 2, 3, 16, and 29 exhibited the highest values, ranging from 0.23 ft/day at Site 1 and 0.56 ft/day at Site 16 (Table 3-6). The highest seepage velocity values indicate that groundwater would take between 14 to 174 years (calculated from Site 3 and 16 values) to travel 1 mile.

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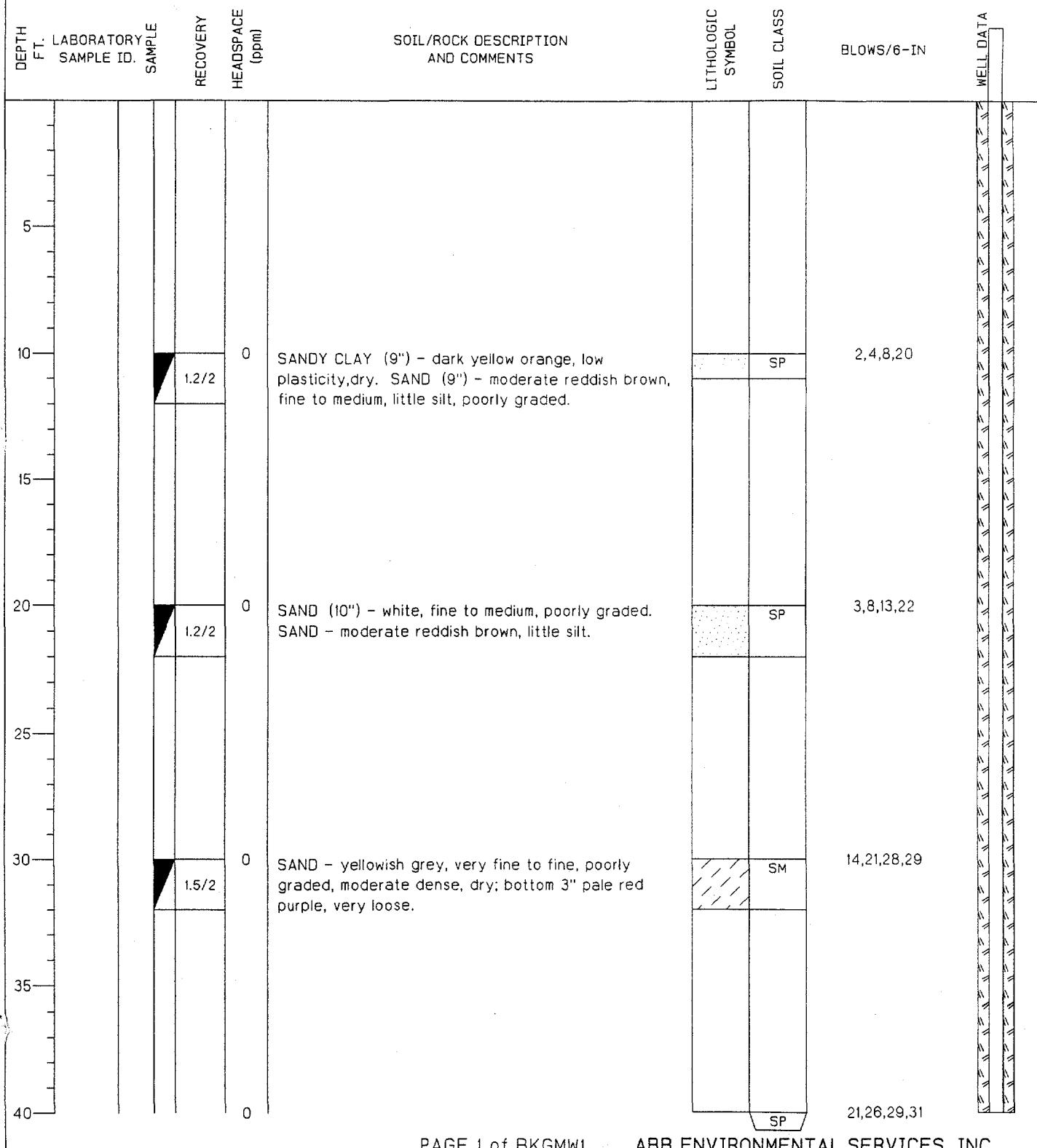
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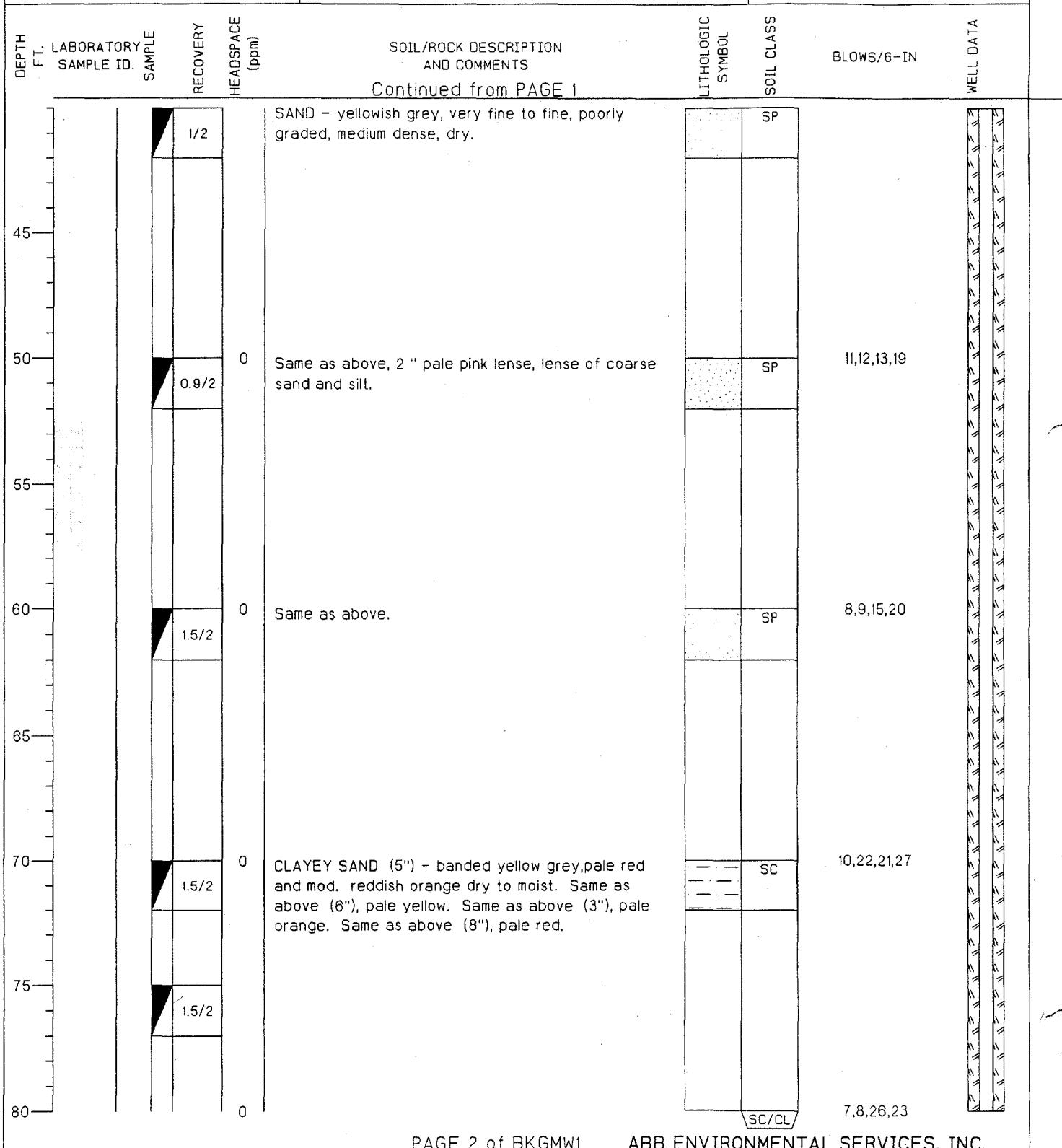
APPENDIX A

PHASE IIA MONITORING WELL LITHOLOGIC LOGS

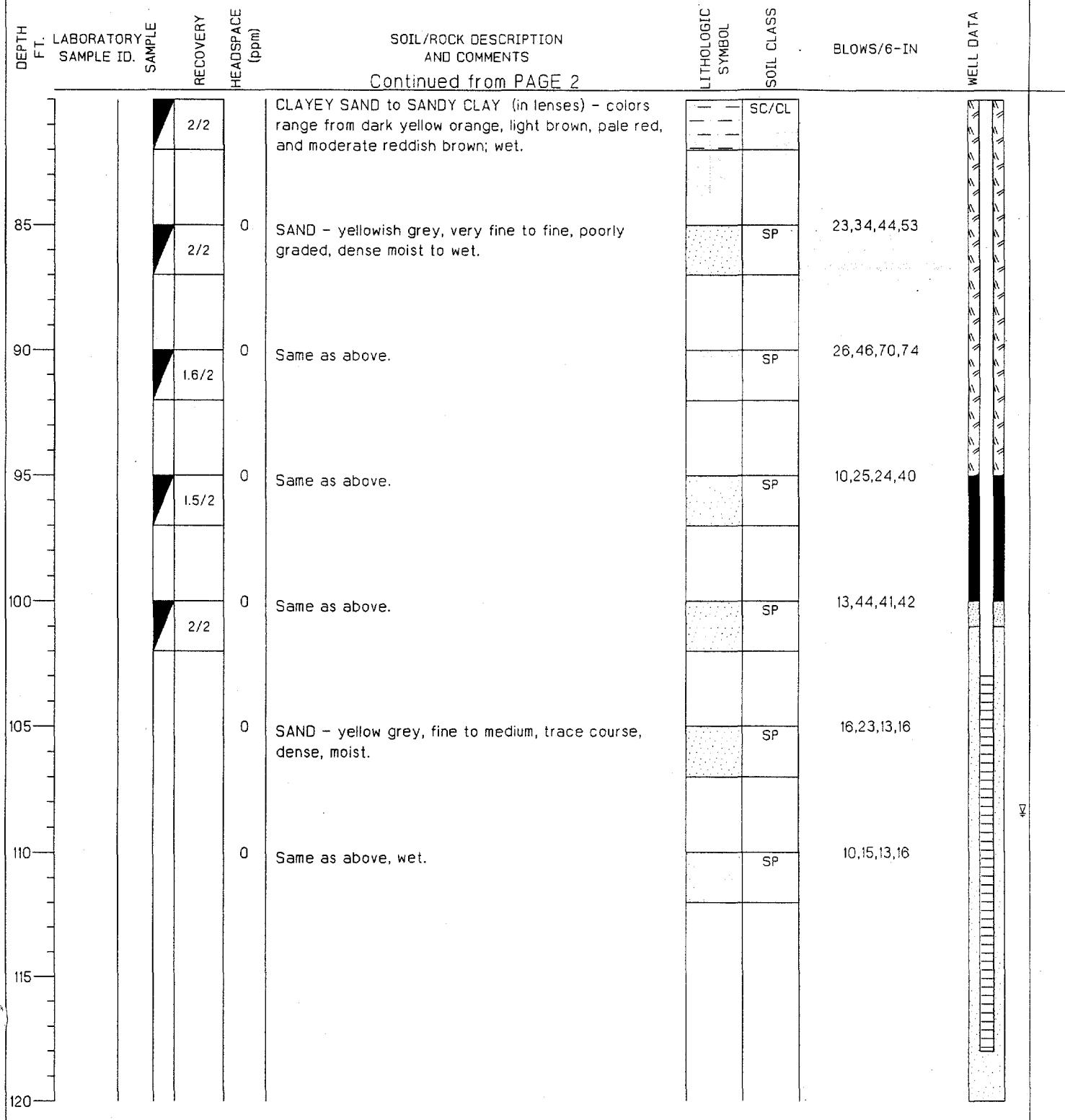
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 103-118 FT	PROTECTION LEVEL: D
TOC ELEV.: 195.67 FT.	MONITOR INST.: FID	TOT DPTH: 118FT.	DPTH TO 108.46 FT.
LOGGED BY: T. Kauffman/G.K.	WELL DEVELOPMENT DATE:		SITE: Background



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-BKG-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
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TOC ELEV.: 195.67 FT.	MONITOR INST.: FID	TOT DPTH: 118FT.	DPTH TO V 108.46 FT.
LOGGED BY: T. Kauffman/G.K.	WELL DEVELOPMENT DATE:		SITE: Background

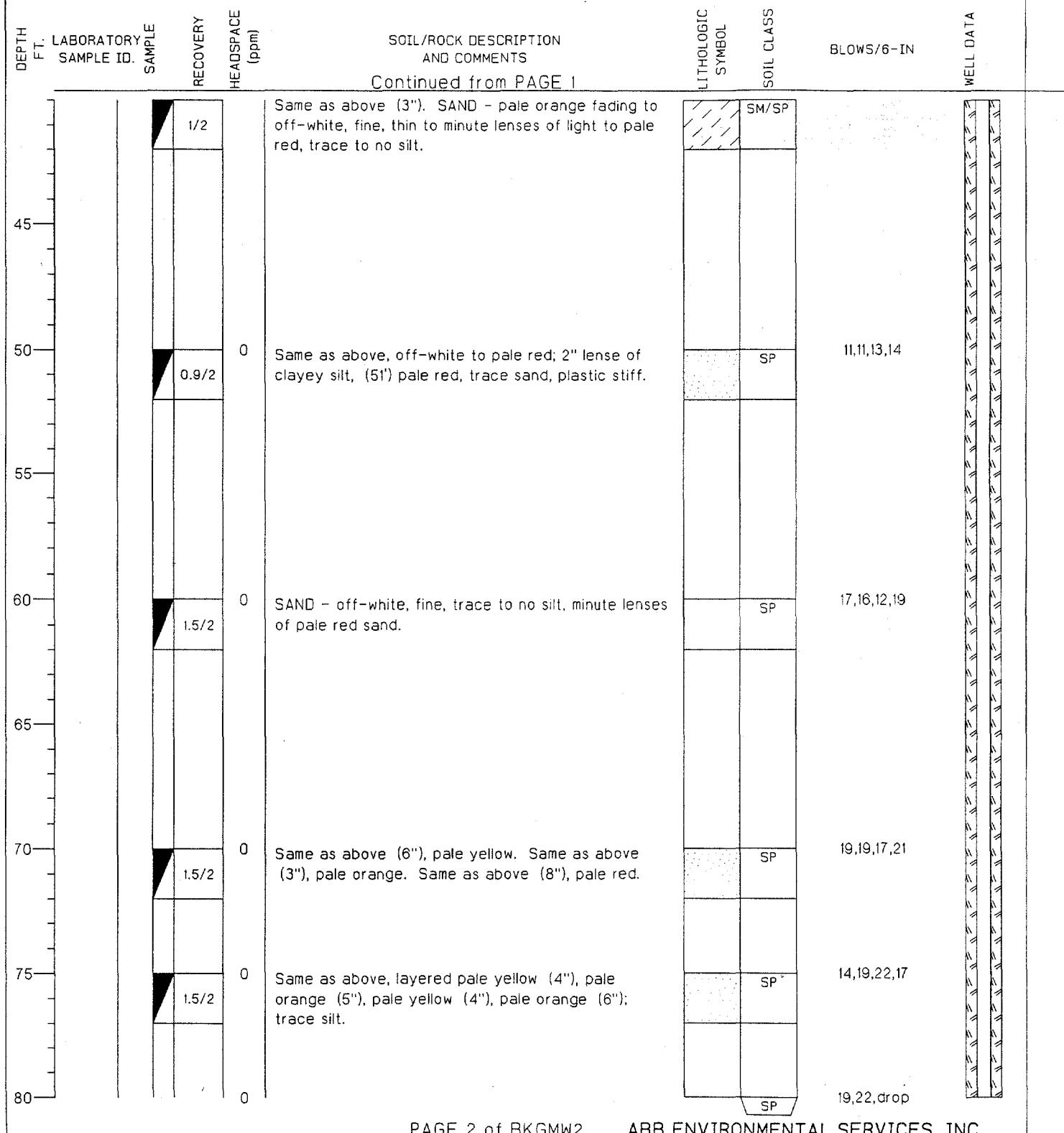


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TOC ELEV.: 195.67 FT.	MONITOR INST.: FID	TOT DPTH: 118FT.	DPHT TO 108.46 FT.
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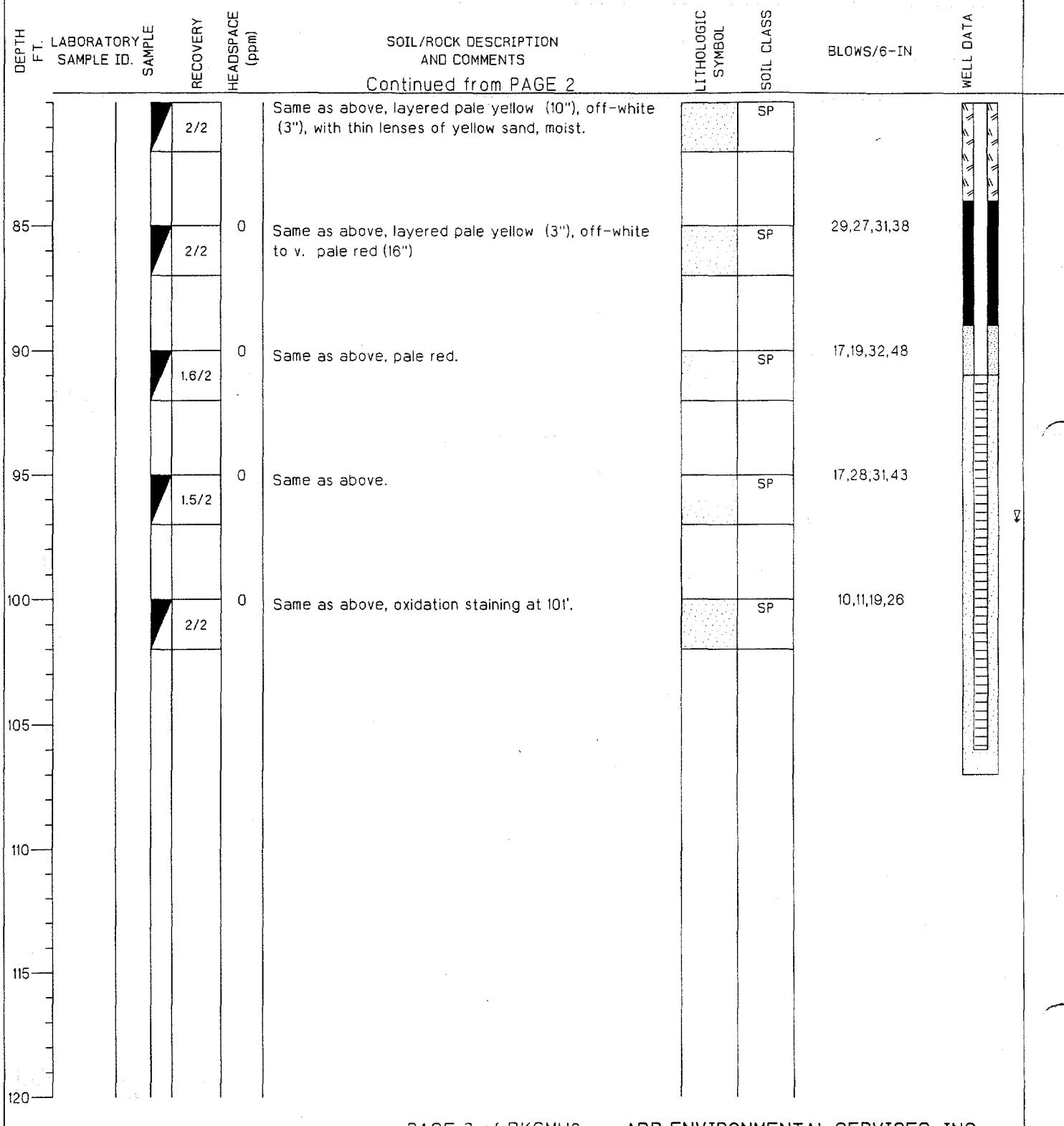


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METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"		SCREEN INT.: 91' - 106'	PROTECTION LEVEL: D				
TOC ELEV.: 180.41 FT.	MONITOR INST.: FID		TOT DPTH: 106FT.	DPTH TO 96.82 FT.				
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:			SITE: Background				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5								
10		1.2/2	0	SILTY SAND - reddish brown, fine, damp.	/	SM	3,4,3,2	
15								
20		1.2/2	0	Same as above, deeper reddish color, thin black silt lense.	/	SM	6,9,11,12	
25								
30		1.5/2	0	Same as above, some fine to medium, thin lenses of white fine medium sand throughout.	/	SM	8,5,5,7	
35								
40			0					11,12,9,11
						SM/SP		

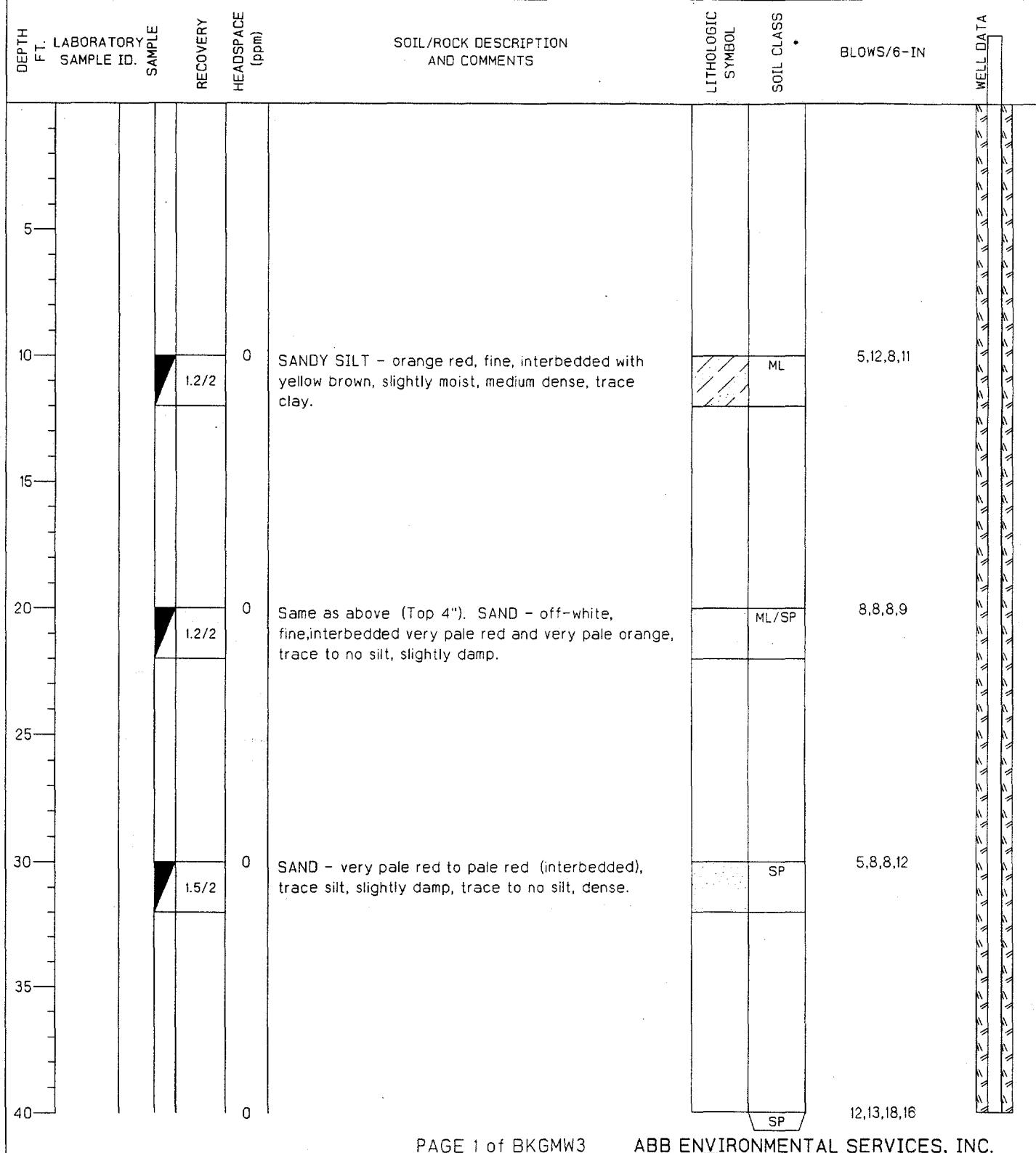
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TOC ELEV.: 180.41 FT.	MONITOR INST.: FID	TOT DPTH: 106FT.	DPTH TO 96.82 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: Background	



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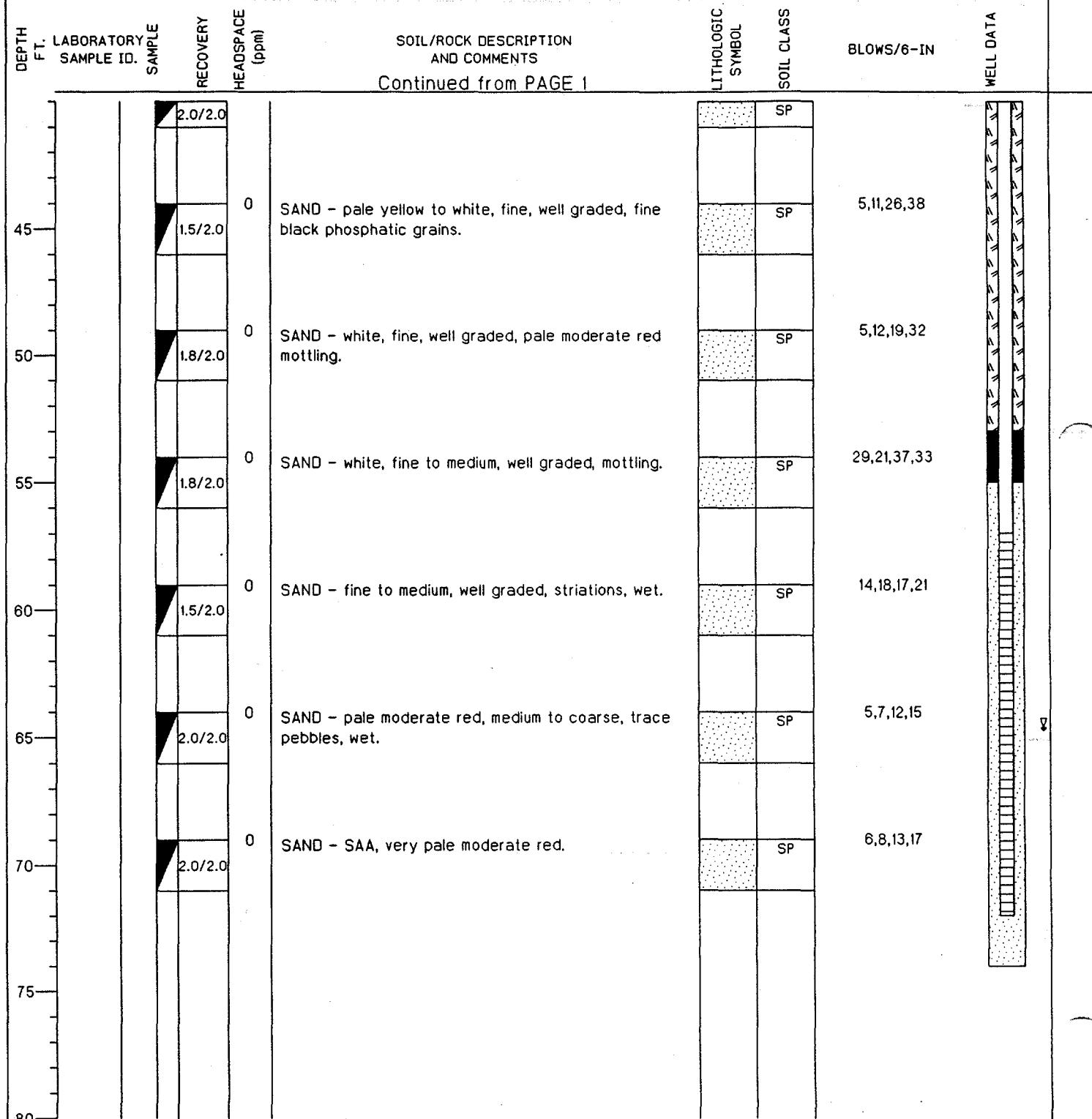
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TOC ELEV.: FT.	MONITOR INST.: FID	TOT DPTH: 79FT.	DPHT TO 72.90 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: Background



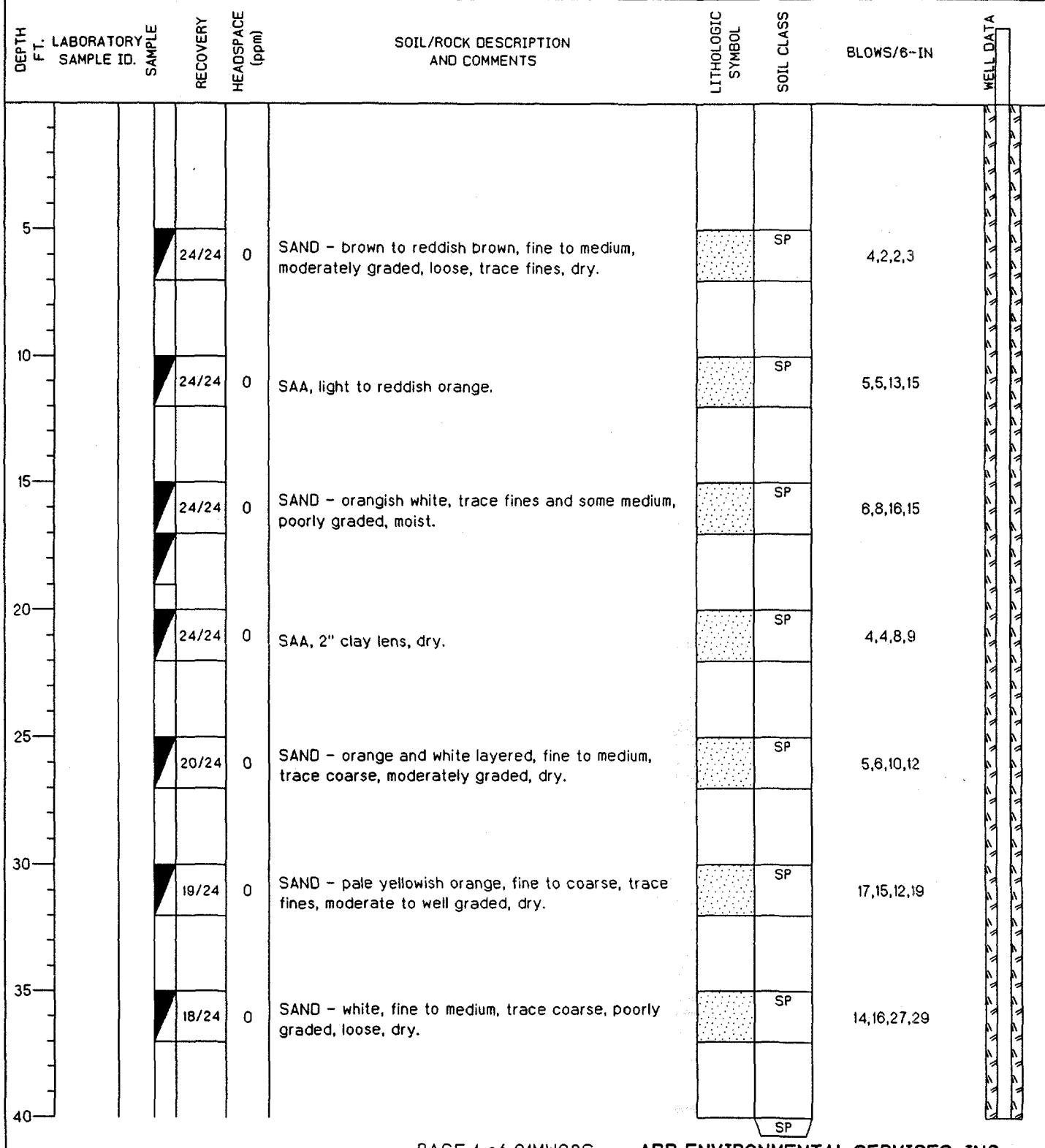
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CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 4/26/93	COMPLTD: 4/26/93			
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TOC ELEV.: FT.	MONITOR INST.: FID	TOT DPTH: 79FT.	DEPTH TO 72.90 FT.				
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: Background				
DEPTH F.T.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1							
45		1/2	SAND - off-white to pale orange, fine, thin layers of orange sand, some orange brown silt in the bottom 4".		SP		
50		0	Same as above, brownish purple (3"), light brown to light tan (8"), trace to some silt.		SP	10,16,19,28	
55							
60		0	SANDY CLAY (4") - brownish purple, some silt, plastic, soft, moist. Same as 50' to 52' (1").		CL/SP	8,18,23,20	
65							
70		1.5/2	Same as above, reddish purple and yellow orange interbedded, saturated		SP	8,9,6,8	
75		1.5/2					
80		0	SANDY CLAY - pale reddish purple interbedded with off-white, thin lense of yellow orange silt, plastic, medium stiff, moist.		SC	5,6,9,12	
					ML	2,3,3,11	

TITLE: NAVAL AIR STATION WHITING FIELD			LOG of WELL: WHF-1-1S	BORING NO.				
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 06/28/93	COMPLTD: 06/28/93					
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 57-72	PROTECTION LEVEL: D					
TOC ELEV.: 143.55 FT.	MONITOR INST.: OVA	TOT DPTH: 74FT.	DPTH TO 64.62 FT.					
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 1 - N.W. Disposal Area					
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			2.0/2.0	0 SAND - orange-brown, very fine to fine, well graded.		SP	4,6,8,11	
10			2.0/2.0	0 SAND - SAA, very pale orange, trace coarse.		SP	5,5,7,6	
15			1.8/2.0	0 SAND - white, fine well graded, fine black phosphatic grains.		SP	7,6,8,7	
20			1.5/2.0	0 SAND - pale moderate red to orange brown mottling, SAA.		SP	5,5,5,12	
25			1.5/2.0	0 SAND - SAA.		SP	3,6,10,11	
30			1.0/2.0	0 SAND - SAA, layers of pale moderate red to orange-brown.		SP	8,9,20,21	
35			1.5/2.0	0 SAND - layers of orange brown, pale yellow, white & tan, medium to coarse.		SP	5,11,14,22	
40			2.0/2.0	0 SAND - fine to medium, trace coarse, mottled orange-brown, pale yellow & white.		SP	15,17,21,30	

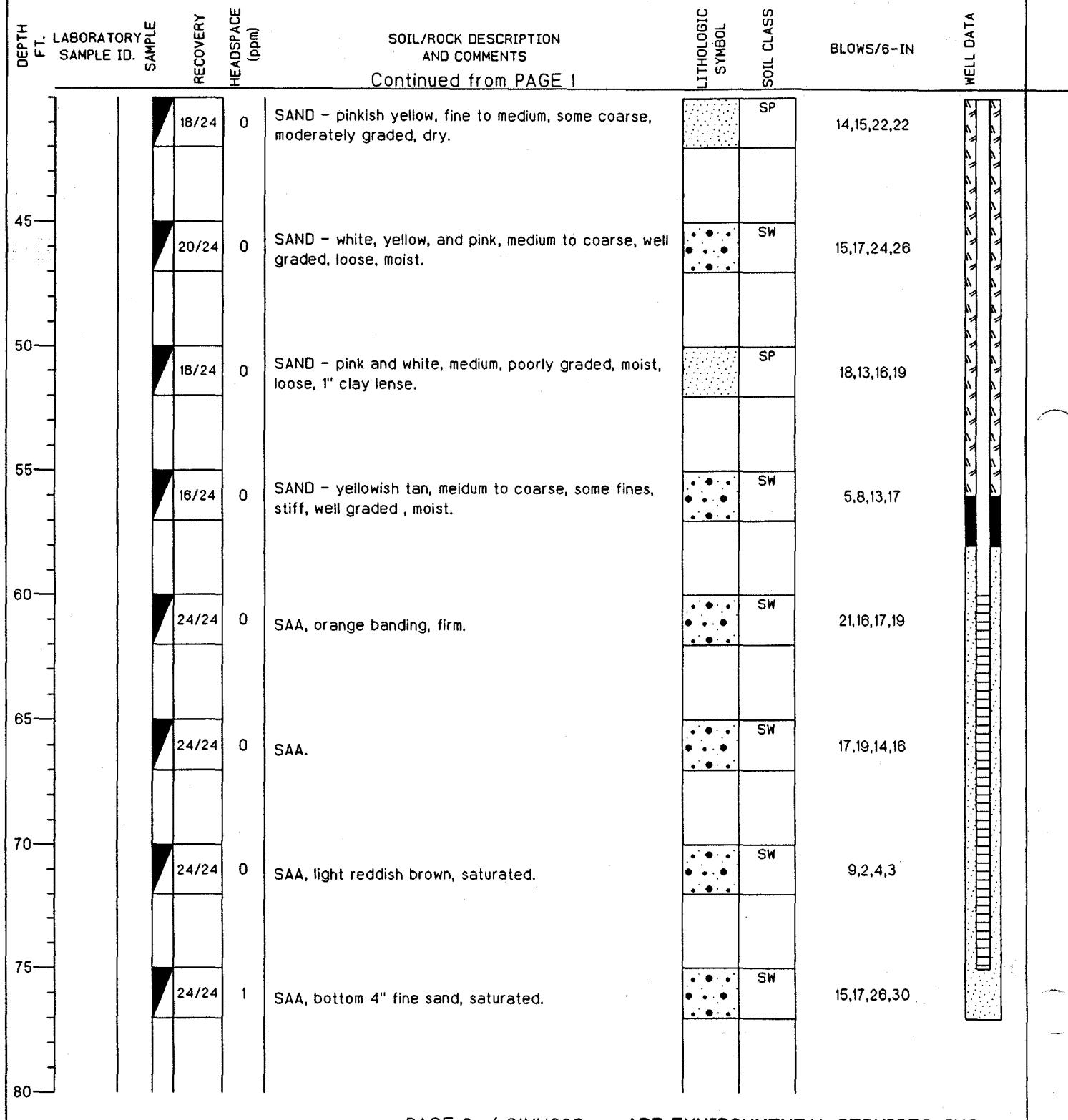
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-1-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 06/28/93	COMPLTD: 06/28/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 57-72	PROTECTION LEVEL: D
TOC ELEV: 143.55 FT.	MONITOR INST.: OVA	TOT DPTH: 74FT.	DEPTH TO ↓ 64.62 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 1 - N.W. Disposal Area



TITLE: NAVAL AIR STATION WHITING FIELD	LOG of WELL: WHF-1-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 02/20/93	COMPLTD: 02/21/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 60-75 FT PROTECTION LEVEL: D
TOC ELEV.: 145.68 FT.	MONITOR INST.: FID	TOT DPTH: 75FT. DPTH TO ↓ FT.
LOGGED BY: L. Foster	WELL DEVELOPMENT DATE:	SITE: I - N.W. Disposal Area



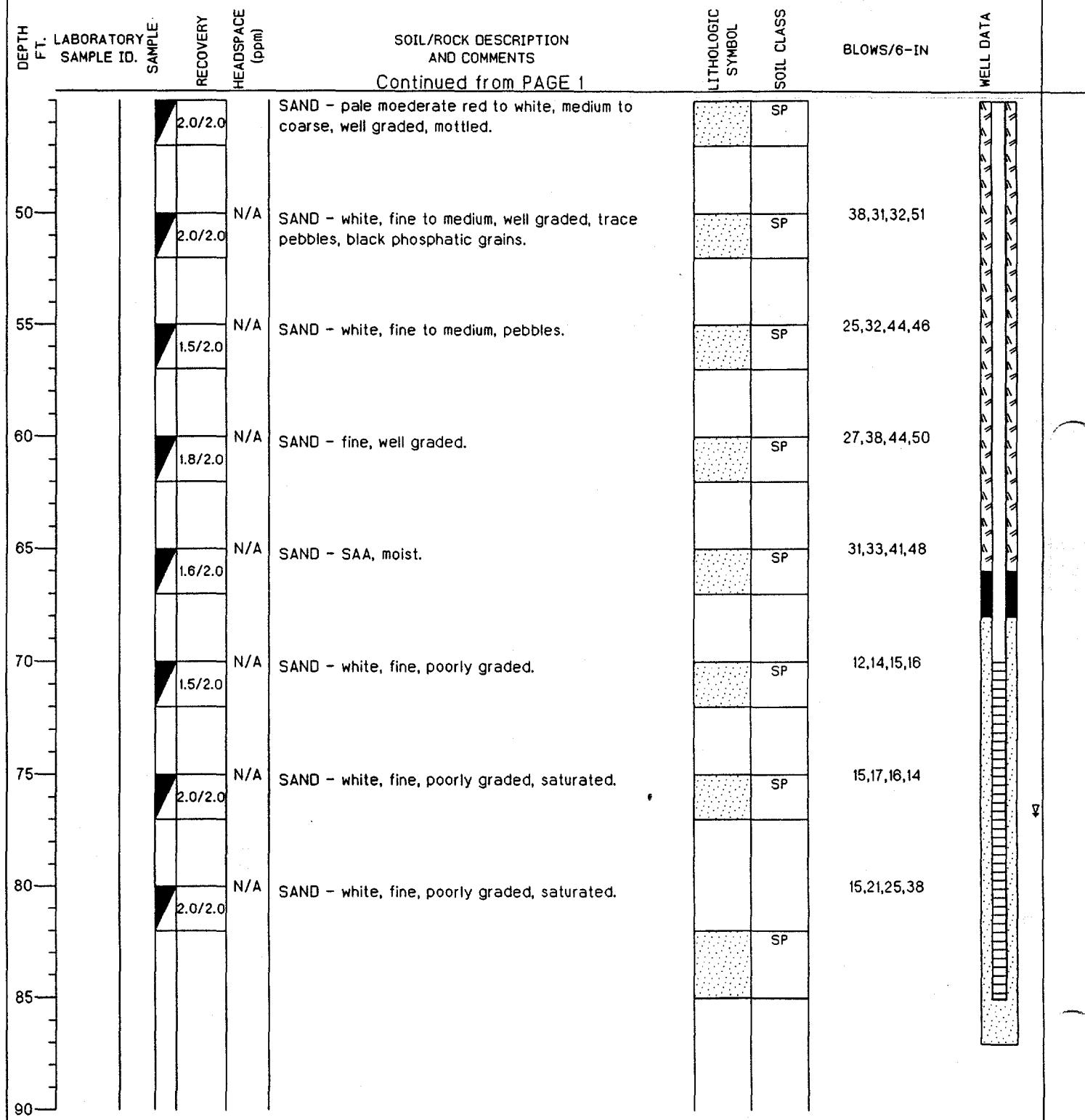
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-1-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/20/93	COMPLTD: 02/21/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 60-75 FT	PROTECTION LEVEL: D
TOC ELEV.: 145.68 FT.	MONITOR INST.: FID	TOT DPTH: 75FT.	DPTH TO 7 FT.
LOGGED BY: L. Foster	WELL DEVELOPMENT DATE:		SITE: 1 - N.W. Disposal Area



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-1-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 06/28/93	COMPLTD: 06/28/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 70-85 FT	PROTECTION LEVEL: D
TOC ELEV.: 156 FT.	MONITOR INST.: OVA	TOT DPTH: 87FT.	DPTH TO 76.72 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: I - N.W. Disposal Area

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				0	SAND - very fine to fine, slightly silty, striations.	SP		8,12,12,14	
10				0	SAND - tan, very fine to fine, well graded, trace silt.	SP		4,6,6,7	
15				0	SAND - fine to medium, striations.	SP		8,9,13,15	
20				0	SAND - white, fine, well graded, mottled.	SP		5,4,5,7	
25				0	SAND - fine to medium, mottled.	SP		7,7,9,12	
30				0	SAND - SAA, medium, well graded, trace coarse.	SP		8,15,15,24	
35				0	SAND - pale yellow to white, fine, trace medium, well graded.	SP		5,7,9,9	
40			N/A	2.0/2.0	SANDY CLAY - moderate red to gray, mottled.	SC		9,8,14,15	
45				N/A		SP		22,33,39,34	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-1-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 06/28/93	COMPLTD: 06/28/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 70-85 FT	PROTECTION LEVEL: D
TOC ELEV.: 156 FT.	MONITOR INST.: OVA	TOT DPTH: 87FT.	DEPTH TO ↓ 76.72 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:	SITE: 1 - N.W. Disposal Area	



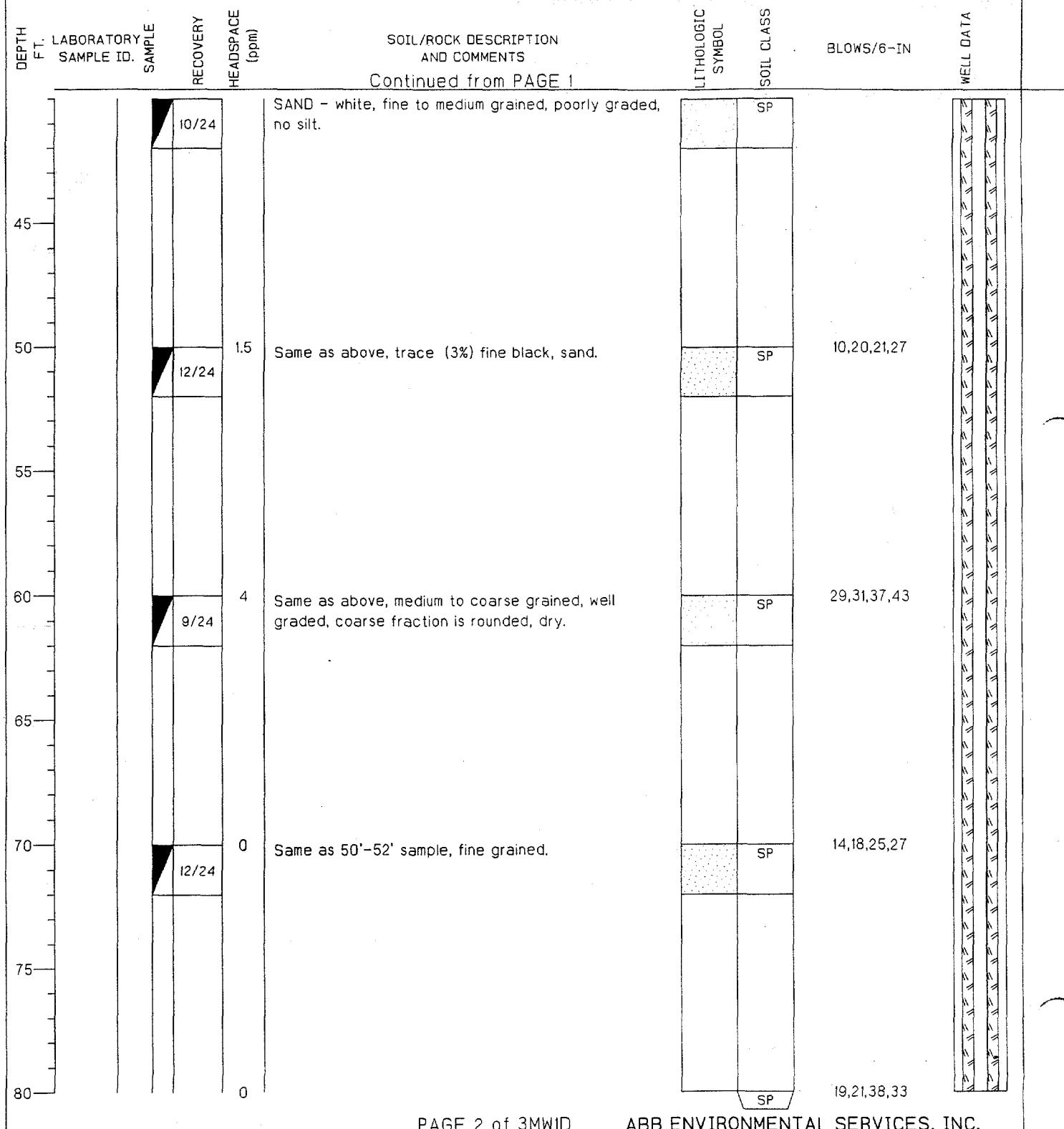
TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-2-1		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 7/16/93		COMPLTD: 7/17/93			
METHOD: MUD ROTARY	CASE SIZE: 2"		SCREEN INT.: 70-85 FT		PROTECTION LEVEL: D			
TOC ELEV.: 151.31 FT.	MONITOR INST.: OVA		TOT DPTH: 87FT.		DPTH TO V 78.1 FT.			
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:			SITE: 2- Land fill				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			BKG 22/24	SILTY SAND - red, fine, poorly graded, loose, damp.	/\ / \ / \ /	SM	3,3,4,3	
10			BKG 24/24	SAND - red, fine, some silt, poorly graded, loose, dry, subrounded.	.....	SP	4,3,2,2	
15			<1 18/24	Same as above.	.....	SP	7,6,8,8	
20			BKG 24/24	Same as above., little silt. Same as above, inter layered medium sand with some fine, tan, poorly graded, medium dense, dry, subangular.	.....	SP	7,6,7,9	
25			BKG 24/24	Same as above. SILTY SAND - red to light orange to light tan, fine, poorly graded, medium dense, dry.	/\ / \ / \ /	SM	11,6,7,9	
30			1 22/24	Same as above. SAND - white, fine, poorly graded, medium dense, moist, subangular.	.....	SP	15,9,10,12	
35			BKG 22/24	Same as above, grade to fine to medium.	.....	SP	14,11,9,16	
40			1 16/24	Same as above, white, fine to medium, poorly graded, dense, moist, subangular.	.....	SP	17,18,19,22	
45			BKG			SP	15,15,21,24	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-2-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/16/93	COMPLTD: 7/17/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 70-85 FT	PROTECTION LEVEL: D
TOC ELEV.: 151.31 FT.	MONITOR INST.: OVA	TOT DPTH: 87FT.	DPTH TO 78.1 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 2- Land fill

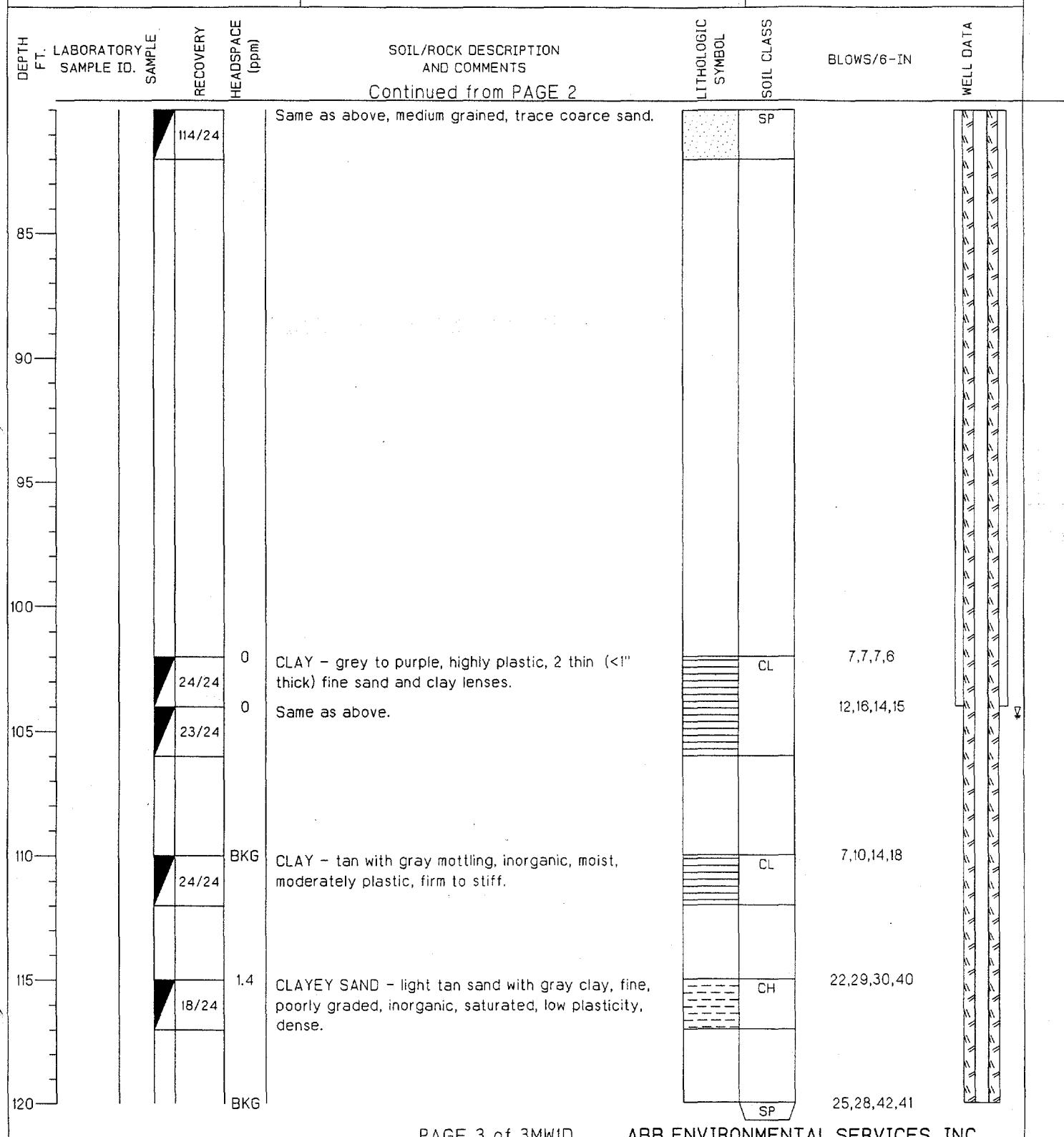
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1							
		20/24	Same as above.		SP		
50		20/24	Same as above.		SP	19,22,23,26	
55		20/24	Same as above, fine grade to medium, small dark staining spots.		SP	27,18,18,22	
60		18/20	Same as above, light pink, trace silt. SILTY SAND - trace clay, low plasticity, poorly graded, medium dense, soft, moist.		SP	12,8,9,20	
65		18/24	SAND - whitish tan with dark green mottling and light pink layering, fine to medium, poorly graded, very dense, dry, subrounded.		SP	23,26,30,19	
70		18/24	Same as above.		SP	19,19,30,40	
75		20/24	Same as above, dark green spotting, light pink layering, dense, wet.		SP	20,20,26,29	
80		24/24	SAND - light tan with rust stain, fine to medium, moderately well graded, medium dense, saturated, subrounded to subangular.		SP/SW	8,10,11,11	
85							
90							

TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-ID	BORING NO.				
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/21/93	COMPLTD: 6/11/93					
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D					
TOC ELEV.: 173.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 182FT.	DPTH TO 104.41 FT.					
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 3					
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				Lithological descriptions begin at 40 feet BLS.				
10								
15								
20								
25								
30								
35								
40			0.4					
					SP		10,14,24,23	
PAGE 1 of 3MW1D					ABB ENVIRONMENTAL SERVICES, INC.			

TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-3-1D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 5/21/93	COMPLTD: 6/11/93
METHOD: MUD ROTARY	CASE SIZE: 2"	PROTECTION LEVEL: D
TOC ELEV.: 173.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 182FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 3



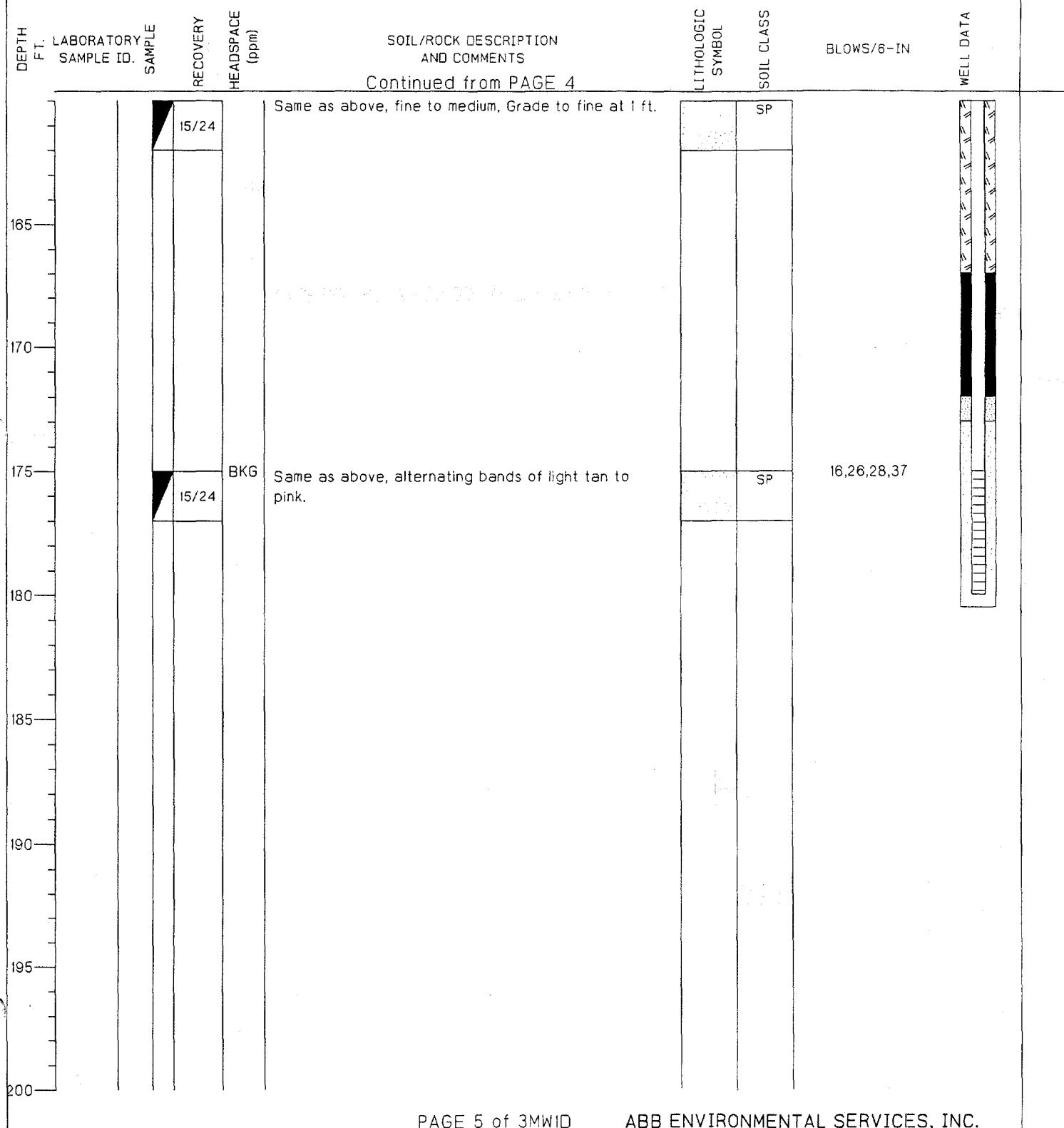
TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-3-10	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 5/21/93	COMPLTD: 6/11/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT PROTECTION LEVEL: D
TOC ELEV.: 173.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 182FT. DPTH TO 104.41 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 3



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-1D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/21/93	COMPLTD: 6/11/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 182FT.	DPTH TO \downarrow 104.41 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN		WELL DATA
								16/24	1/24	
Continued from PAGE 3										
125			N/A		REFUSAL, SAND - tan, fine, poorly graded, saturated, very dense.				SP	23,56,-Refsl
130			>10		Same as above, except OVA of spoon is 10 ppm.				SP	18,37,50,-
135										
140			BKG		Same as above, no OVA detects.				SP	27,46,48,44
145										
150			BKG		Same as above, except grading down to medium sand.				SP	22,37,52,-
155										
160			N/A						SP	34,42,42,50+

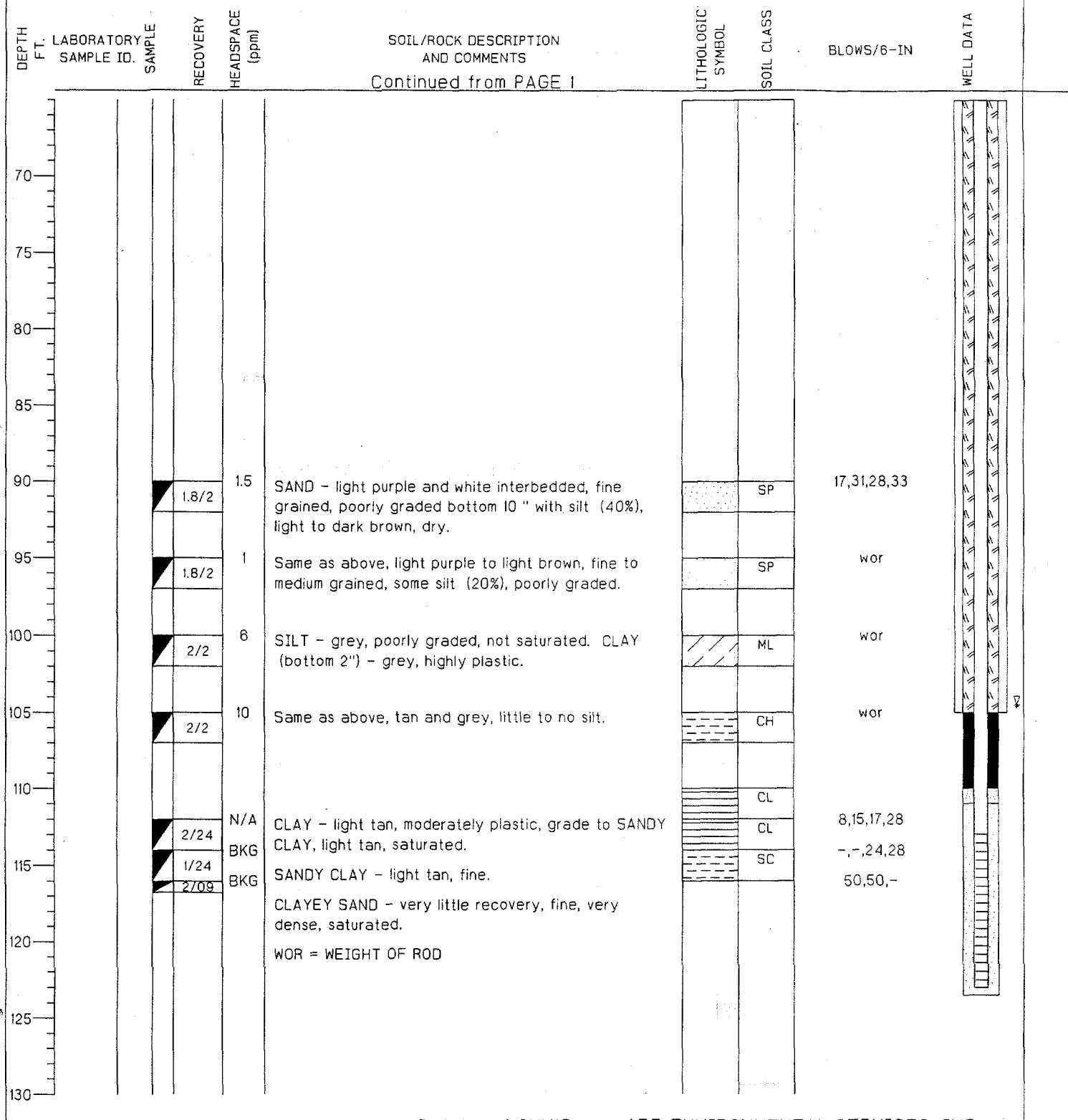
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-ID	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/21/93	COMPLTD: 6/11/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 182FT.	DPTH TO ∇ 104.41 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 3



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 113-123 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.26 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 123.5FT.	DPTH TO 104.53 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 3	

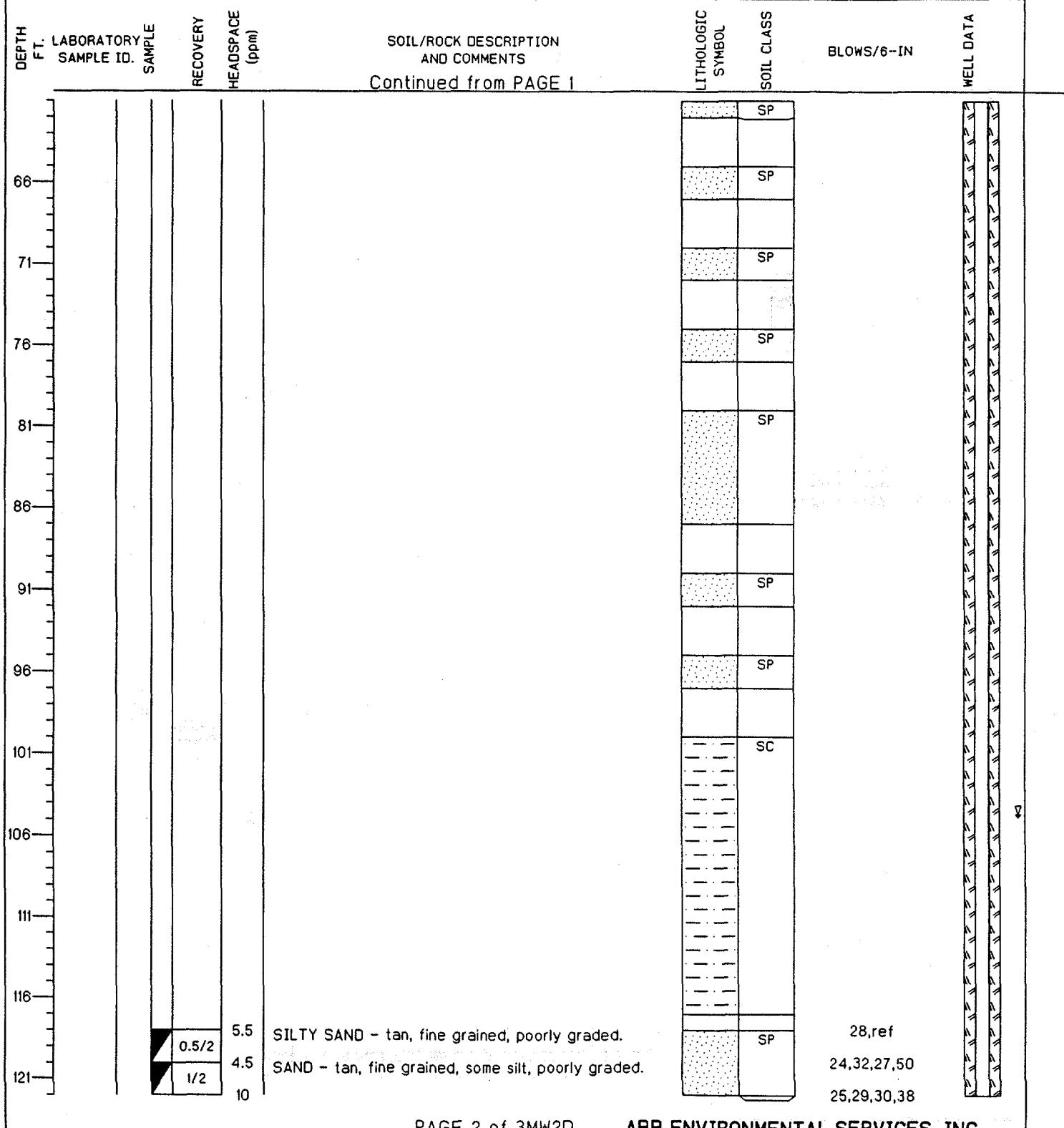
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5					SEE WHF-3-1D FOR LITHOLOGICAL DESCRIPTIONS BETWEEN 40 AND 90 FT BLs.				
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 113-123 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.26 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 123.5FT.	DPTH TO ∇ 104.53 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 3



TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-20		BORING NO.				
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA						
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/9/93	COMPLTD: 5/10/93					
METHOD: MUD ROTARY	CASE SIZE: 2"		SCREEN INT.: 175-180 FT	PROTECTION LEVEL: Modified D					
TOC ELEV.: 173.4 FT.	MONITOR INST.: FID/OVA		TOT DPTH: 180FT.	DPTH TO ↓ 104.69 FT.					
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:			SITE: 3					
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5					SEE WHF-3-2S FOR ADDITIONAL LITHOLOGICAL DESCRIPTIONS. SPOONS FOR WHF-3-2D WERE COLLECTED ONLY BELOW 118 FEET.		SP		
10							ML		
15							ML		
20							ML		
25							ML		
30							ML		
35							SP		
40							SP		
45							SP		
50							SP		
55							SP		
60							SP		

TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-3-2D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 5/9/93	COMPLTD: 5/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	PROTECTION LEVEL: Modified D
TOC ELEV.: 173.4 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:	SITE: 3

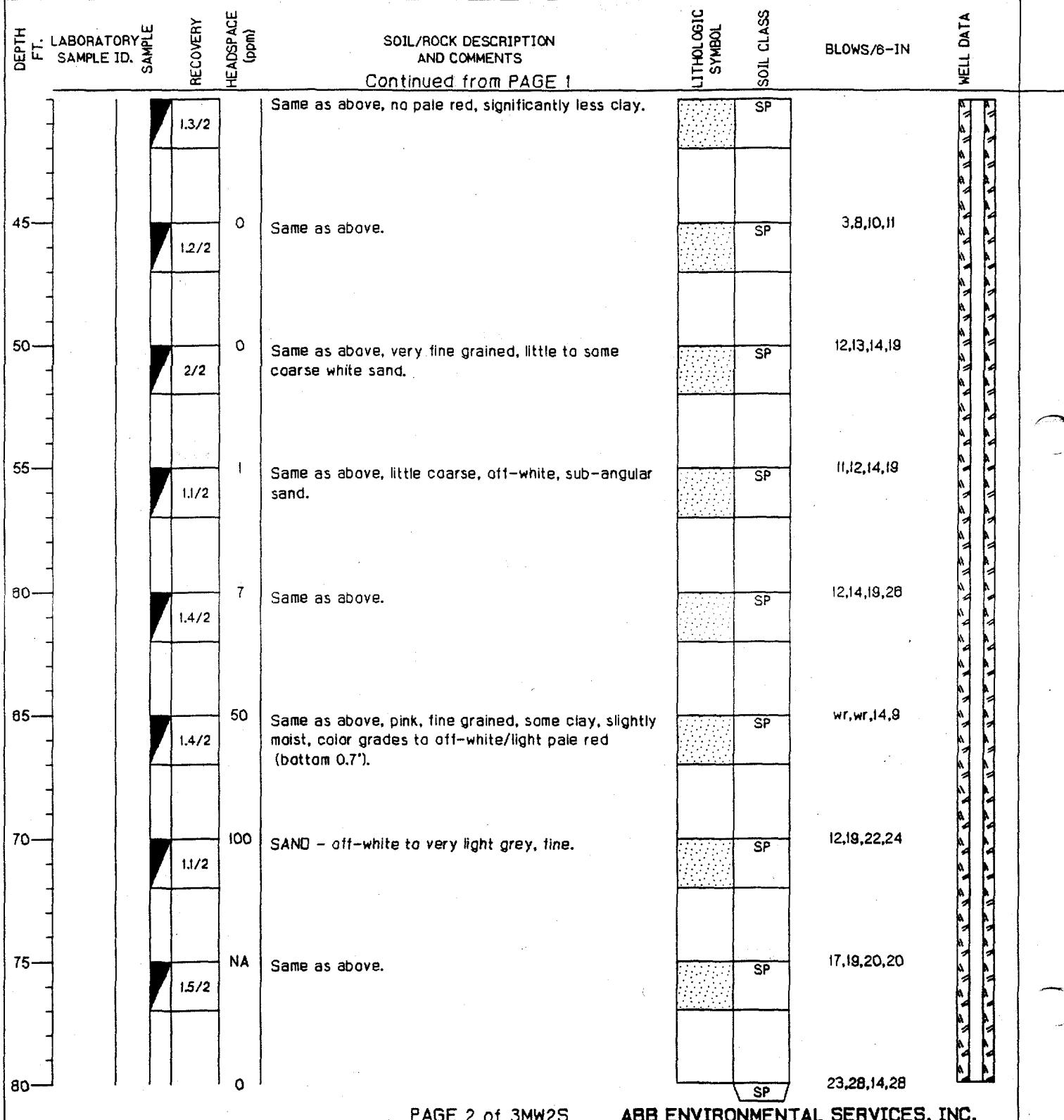


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-2D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/9/93	COMPLTD: 5/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 173.4 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPTH TO V 104.69 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2									
127			1/2		Same as above.				
132			1/2		Same as above, white to tan.		SP	17,26,25,35	
137			1.3/2		Same as above, white, no clay or silt.		SP	26,27,39,48	
142			0.8/2		Same as above (mud stained).		SP	20,29,24,40	
147			0.5/2		Same as above.		SP	28,38,50,ref	
152			0.8/2		Same as above, fine to medium grained.		SP	12,17,17,25	
157			1/2		Same as above.		SP	15,19,18,19	
162			0.8/2		SAND - tan, medium to coarse grained, well graded, 2" reddish brown lense.		SP	28,40,45,50	
167			1.4/2						
172			1/2		SAND (6") - white to light pink, medium grained; bottom light brown, fine grained, some silt.		SP	30,41,49,43	
177					SAND - light tan, medium grained, well graded, some coarse, little to no silt, saturated.		SP	28,60,50,ref	
182									

TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-2S		BORING NO.			
IDENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/8/93	COMPLTD: 5/8/93				
METHOD: Hollow Stem Auger	CASE SIZE: 2"		SCREEN INT.: 100-115 FT	PROTECTION LEVEL: B, Modified D				
TOC ELEV.: 174.98 FT.	MONITOR INST: FID		TOT DPTH: 115FT.	DPTH TO 101.37 FT.				
LOGGED BY: D. Wang	WELL DEVELOPMENT DATE:			SITE: 3				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5	NA	18		SAND - tan, fine grained, some clay, little silt, medium dense, damp.		SP		
10	2/2	3		CLAYEY SAND/SANDY CLAY - red and light tan, fine grained, firm (stiff) low plasticity, little silt.		ML	2,1,7,9	
15	2/2	2		Same as above.		ML	1,4,7,9	
20	2/2	2		SANDY CLAY - light red brown, low plasticity, trace silt, firm (stiff) sand is white and fine grained.		ML	3,4,8,5	
25	1.5/2	0		Same as above.		ML	5,7,8,8	
30	1.2/2	0		Same as above (0.8'). SAND (0.8') - off-white, fine grained, no silt.		ML	3,14,8,7	
35	1.7/2	0		Same as above, little white clay, moist; white coarse sand lens at 31', sub-angular.		SP	8,7,8,7	
40	1.9/2	0		Same as above.		SP	2,8,7,9	
						SP	5,5,7,9	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-2S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 100-115 FT	PROTECTION LEVEL: B, Modified D
TOD ELEV.: 174.98 FT.	MONITOR INST.: FID	TOT DPTH: 115FT.	DPHT TO 101.37 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 3



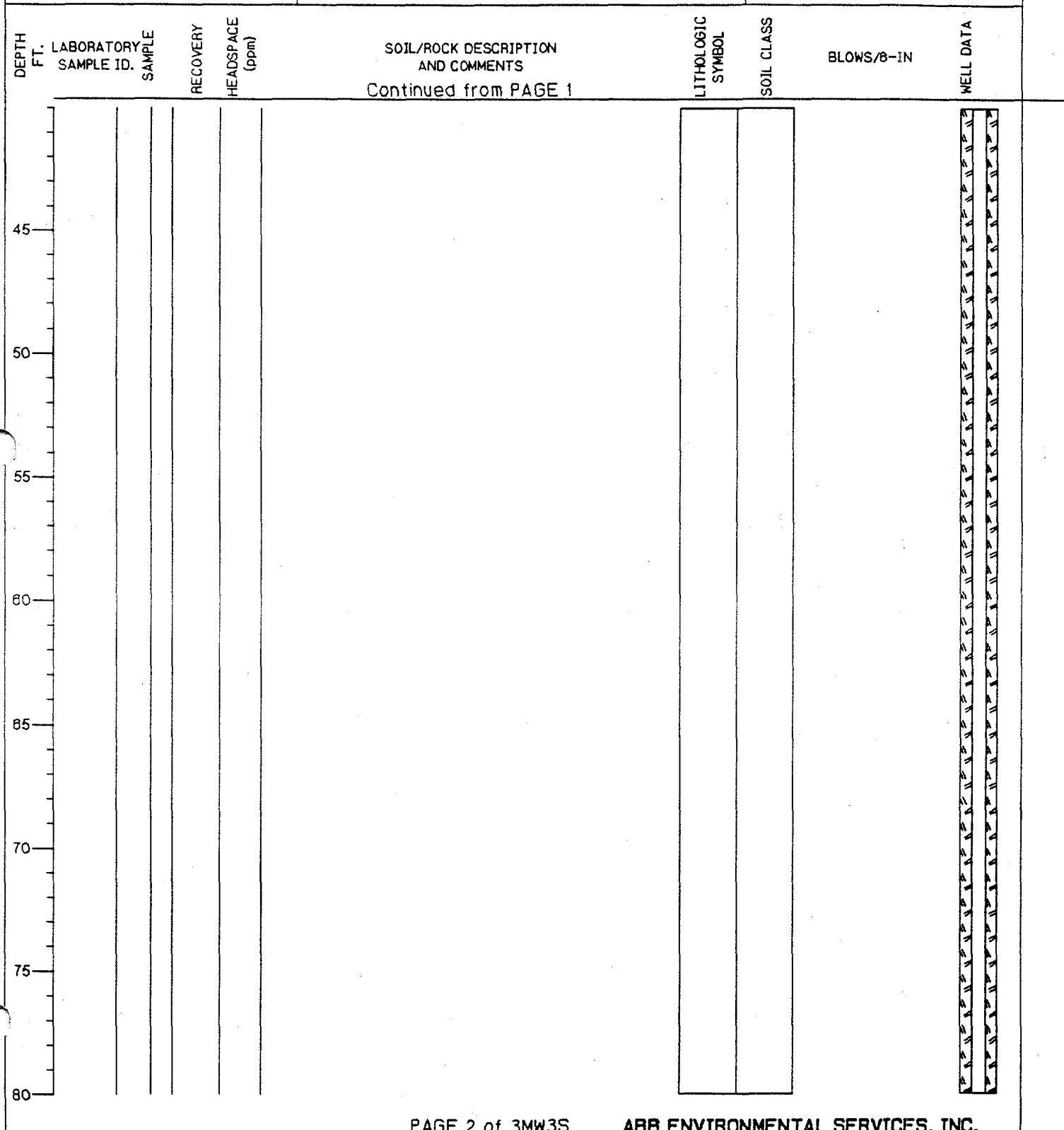
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-2S	BORING NO.
IDENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT: 100-115 FT	PROTECTION LEVEL: B, Modified D
TOD ELEV.: 174.98 FT.	MONITOR INST: FID	TOT DPTH: 115FT.	DPHTH TO ↓ 101.37 FT.
LOGGED BY: D. Wang	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2							
		1.8/2	Same as above, interbedded with light yellow and pink.		SP		
85		25	Same as above, yellow brown to off-white, some silt; 2" lense of silty clay (30'), red brown mottling, plastic, medium stiff.		SP	10,20,33,35	
90		100	Same as above, purple, yellow, tan, off-white and yellow brown mixture no lense.		SP	9,13,18,22	
95		80	SANDY CLAY/CLAYEY SAND (I) - same coloring as above, very low plasticity, semi firm (medium stiff). SAND - Same as 90 - 92'.		SP	20,46,41,28	
100		85	Same as above, light brown to brown purple.		ML	12,8,6,10	
105		40	SANDY CLAY - very light grey, red brown and yellow brown mottling, plastic, firm (stiff), saturated.			10,9,11,11	
110		4	CLAY - light grey, yellow brown mottling, little fine sand, trace silt plastic, firm, moist.			3,3,7,10	
115		4	SANDY CLAY/SILTY CLAY - mottling as above, low plasticity, firm.			wr	
120		5	Same as above, sandy clay.			3,4,12,18	
		2/2	Same as above, some silt, 2 clay lenses (3" thick)			-3,11,12	
		2/2	Same as above, top 6" clay, plastic, little silt, trace sand.		ML/CL	6,7,8,8	
		2/2	Same as above, increased clay content.		ML/SP	wr,12,21,18	
		NA	Same as above, yellow brown, stiff.			wr,8,13,25	

TITLE: Naval Air Station Whiting Field		LOG OF WELL: WHF-3-3S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT: 100-110 FT	PROTECTION LEVEL: Modified D
TOD ELEV.: 175.45 FT.	MONITOR INST: FID	TOT DPTH: 112FT.	DPHT TO GND: 104.38 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-3-MW-3D FOR LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-3S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 100-110 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.45 FT.	MONITOR INST.: FID	TOT DPTH: 112FT.	DPTH TO ♀: 104.36 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3



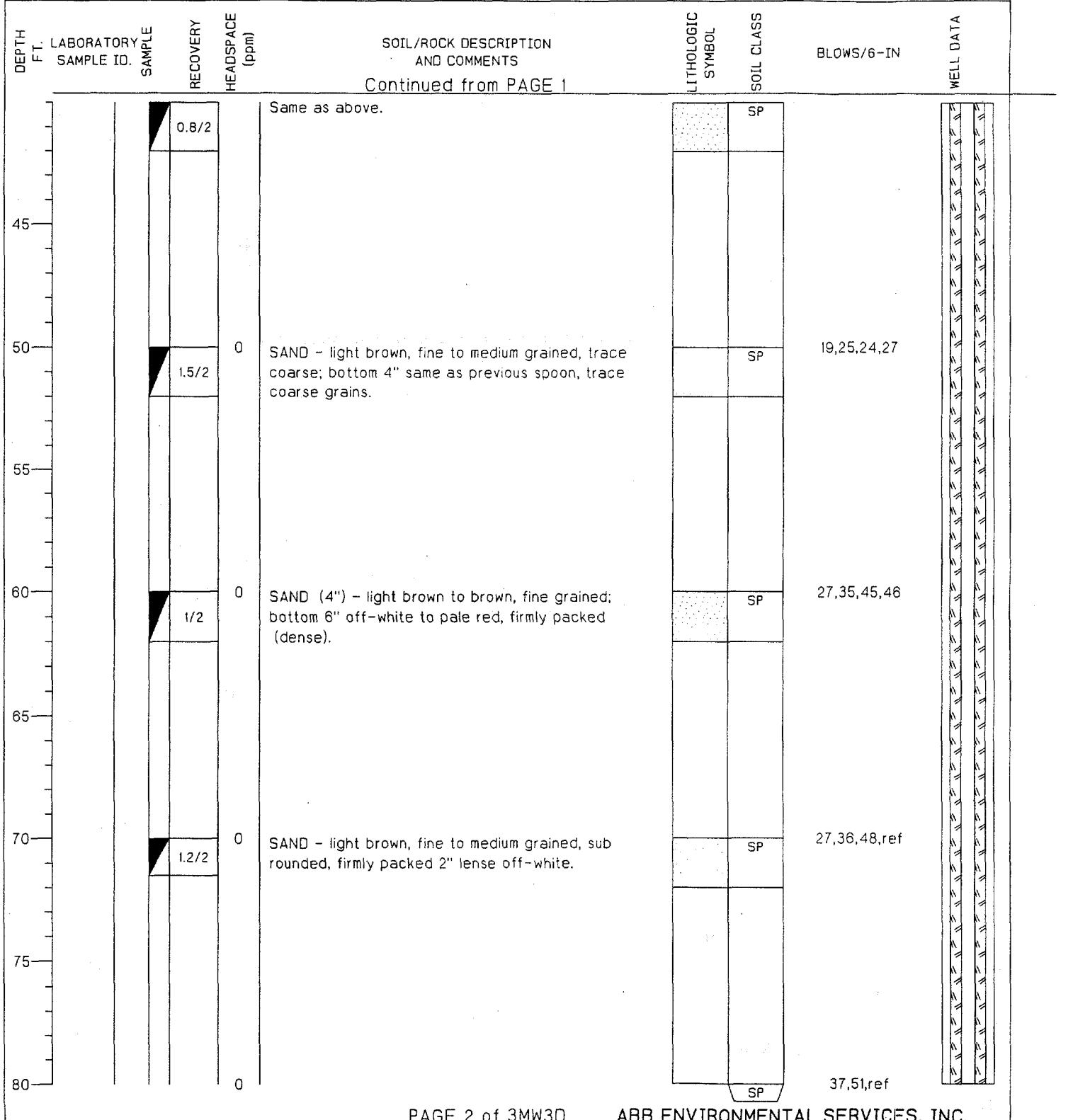
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-3S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/8/93	COMPLTD: 5/8/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 100-110 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.45 FT.	MONITOR INST.: F10	TOT DPTH: 112FT.	DPTH TO : 104.38 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3

TITLE: Naval Air Station Whiting Field				LOG OF WELL: WHF-3-4		BORING NO.		
IDENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 7/28/93		COMPLTD: 7/31/93		
METHOD: MUD ROTARY		CASE SIZE: 2"		SCREEN INT: 111-121 FT		PROTECTION LEVEL: 0		
TOC ELEV.: 174.44 FT.		MONITOR INST: OVA		TOT DPTH: 121FT.		DPTH TO 0 FT.		
LOGGED BY: G.Walker		WELL DEVELOPMENT DATE: N/A				SITE: 3		
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5	N/A		0	SAND - dark yellow orange, very fine to fine, dry, 8" organic rich layer at 3 feet.				
10	1.5/2		0	SAND - dark yellowish orange, very fine to fine, dry, bottom 3" moderate reddish brown with dark yellow mottling		SP	2,3,4,12	
15	1.6/2		0	Same as above, moderate reddish brown, medium dense, poorly graded, dry, trace clay.		SP	6,7,10,12	
20	1.6/2		0	Same as above, some pale yellow orange mottling.		SP	10,12,13,14	
25	1.5/2		0	Same as above, moderate orange pink, very pale orange mottling, medium dense, poorly graded, dry, trace clay.		SP	6,7,7,8	
30	1.8/2		0	Same as above		SP	8,10,12,14	
35	1.5/2		0	Same as above, bottom 1 foot very pale orange, poorly graded, dry.		SP	8,9,9,12	
40	1.9/2		0	Same as above.		SP	8,9,12,12	
45	1/2		0	Same as above.		SP	8,13,14,16	
50	1/2		0	Same as above, moist.		SP	13,20,22,28	
55	0.8/2		0	Same as above, sub-rounded, very dense, trace 1" size gravel, moist.		SP	20,22,26,31	
60	1.1/2		0	Same as above, greyish yellow, poorly graded, sub-rounded, very dense, moist, no gravel.		SP	21,28,38,41	
65	0.9/2		< 1	Same as above.		SP	26,28,26,31	
70								21,31,38,34
75								
80								
85								

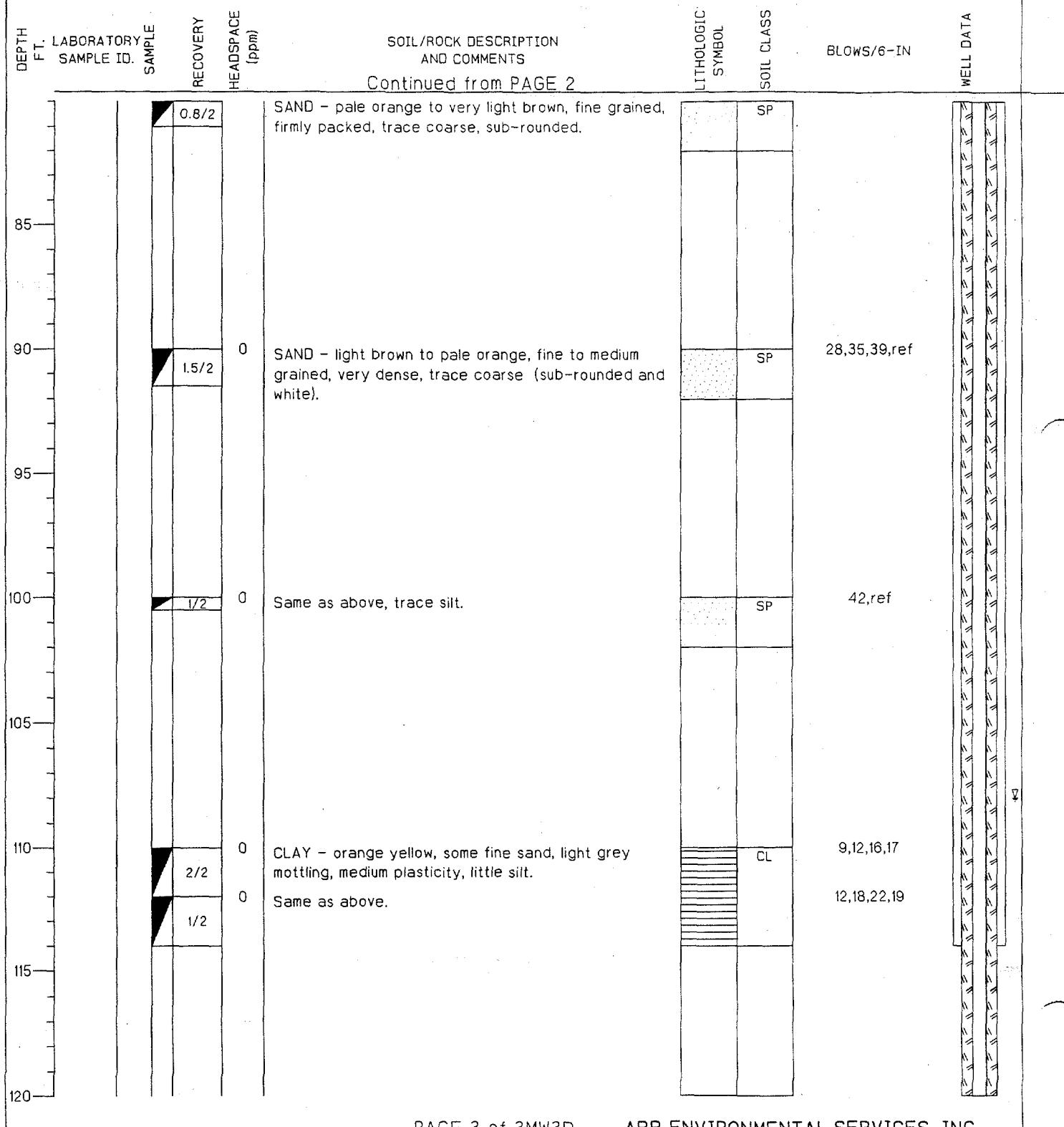
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-4	BORING NO.			
CLIENT: SOUTHNAVF ACENGCOM		PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/28/93	COMPLETED: 7/31/93			
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT: 111-121 FT	PROTECTION LEVEL: 0			
TOC ELEV.: 174.44 FT.	MONITOR INST: OVA	TOT DPTH: 121FT.	DEPTH TO 0			
LOGGED BY: G.Walker	WELL DEVELOPMENT DATE: N/A		SITE: 3			
DEPTH FT: LABORATORY SAMPLE ID. SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS Continued from PAGE 1	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
70	0.8/2 1/2	Same as above, moderate orange pink. Same as above, greyish orange pink.	SP	SP	41,48,50,55	
75	5.5 0.9/2	Same as above, with very pale orange layering.	SP	SP	30,34,34,50	
80	20 0.8/2	Same as above top 8", over pale yellow orange sand.	SP	SP	32,38,42,44	
85	8 1/2	Same as above.	SP	SP	38,39,47,48	
90	20 0.9/2	Same as above, moderate reddish brown mottling.	SP	SP	38,37,50,41	
95	5.5 0.8/2	Same as above, light red and pale orange layering, trace clay, moist.	SP	SP	18,13,13,10	
100	1 1.9/2 <1 2/2	Same as above top 8". CLAY - greenish grey, trace very fine sand, very stiff, slightly plastic, moist. Same as above.	CL	CL	14,17,18,20 12,14,14,17	
105	0	No recovery.	CL/SP	CL/SP	10,9,11,14	
110	0 2/2 1.8/2 1.9/2	CLAY - pale red, little very fine to fine sand, hard, poorly graded, non plastic, moist. CLAY - Dark yellowish brown, hard, trace very fine sand, moist.	CL/SP	CL/SP	8,12,18,24 8,13,19,19	
115	0 1.8/2	Same as above,top 18". SAND - very pale orange, fine to very fine, very dense, poorly graded, wet. Same as above, moderate orange pink.	SP	SP	7,14,28,32 28,31,48,49	
120						
125						
130						

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-30	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.96 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DPTH TO 108.03 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3

SOIL/ROCK DESCRIPTION
AND COMMENTS



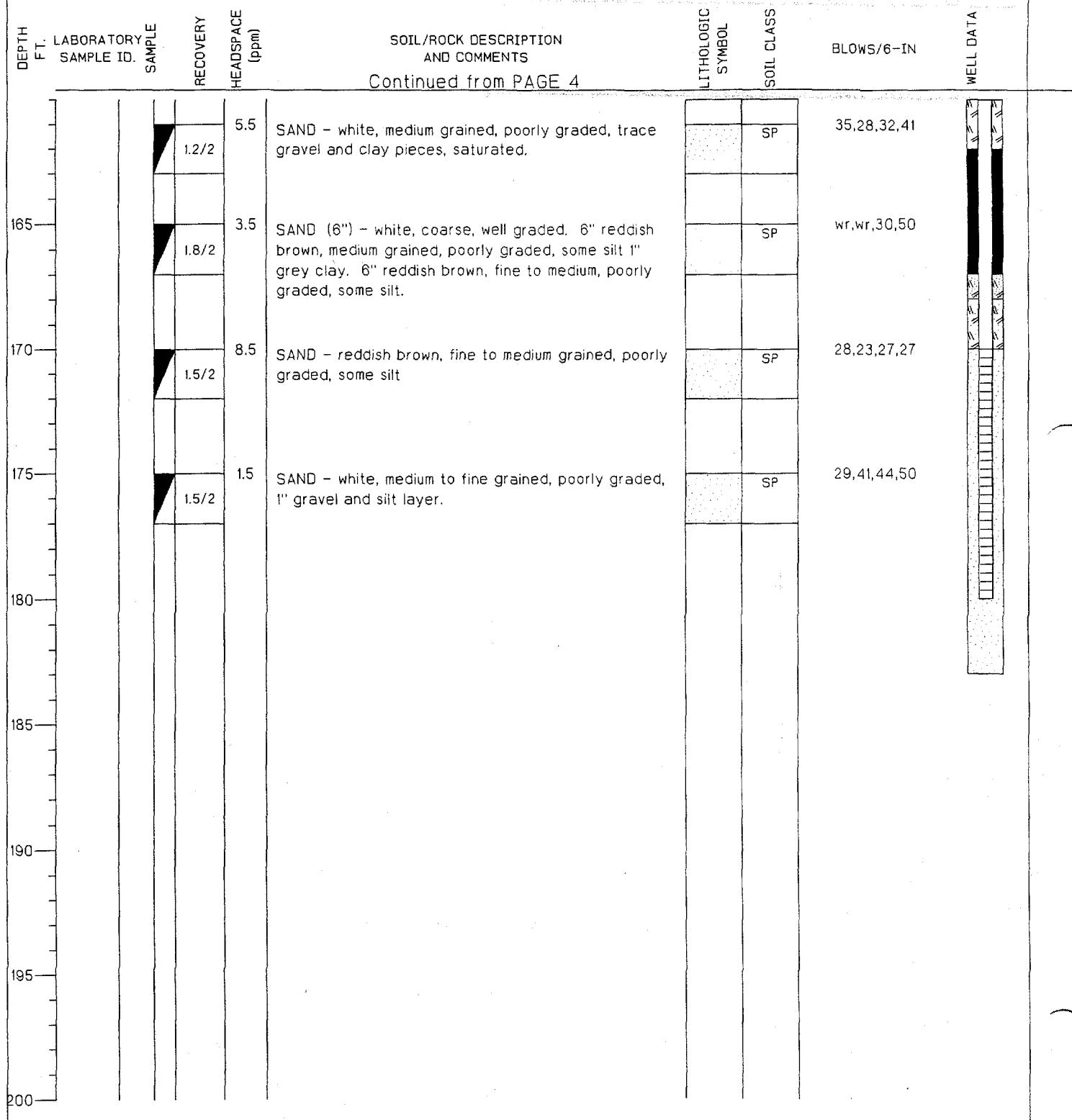
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.96 FT.	MONITOR INST.: FIO	TOT DPTH: 180FT.	DPTH TO 108.03 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:	SITE: 3	



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.96 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DPTH TO 108.03 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:	SITE: 3	

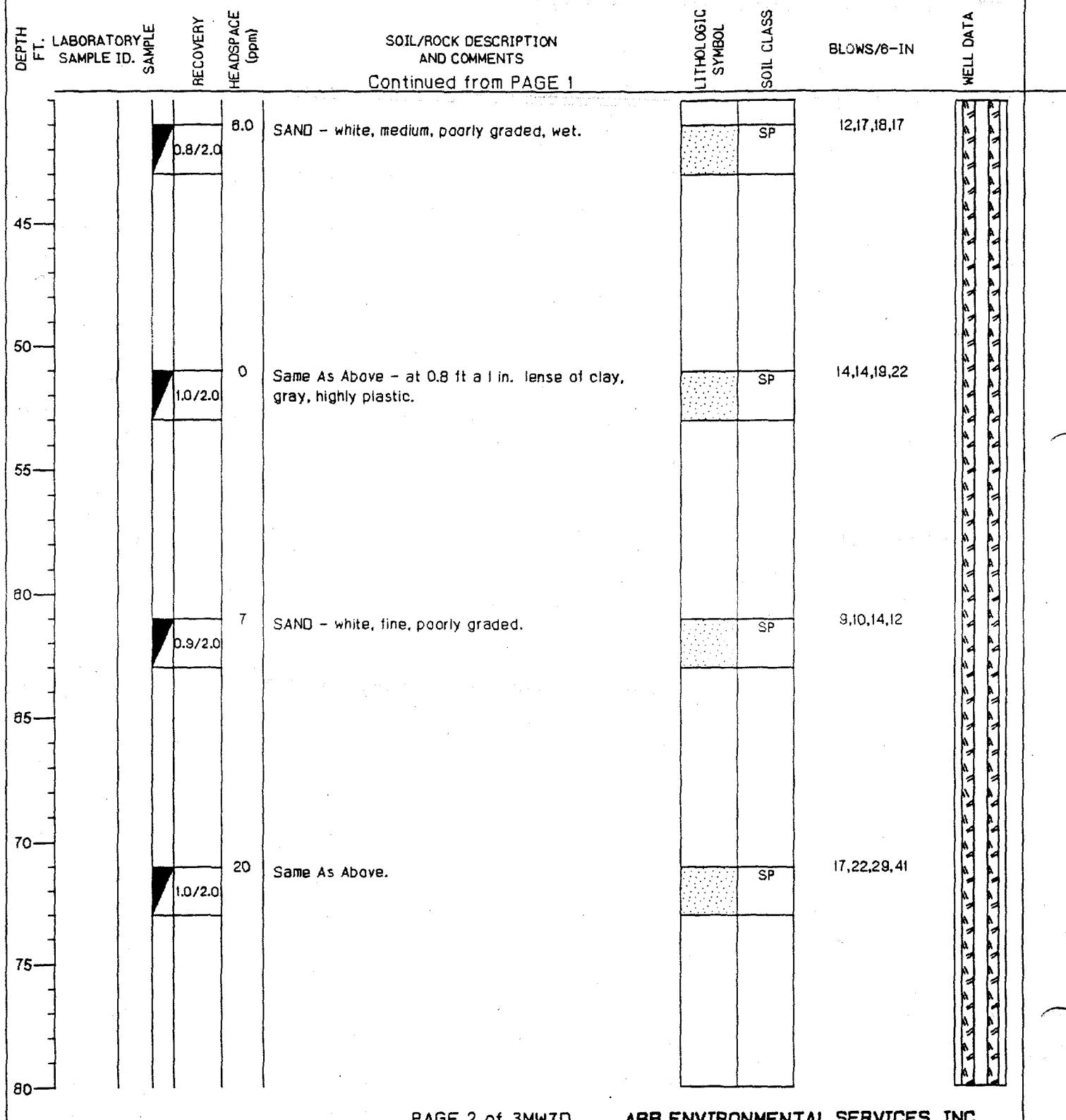
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS <i>Continued from PAGE 3</i>	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
125			2/2	1.5	CLAY - light grey, red and light brown mottling, very plastic, bottom 1' dark red, with medium sand, slightly plastic.	CH		17,24,60,ref	
130					No Data Available between 130 and 160 FT. BLS.	OL			
135									
140									
145									
150									
155									
160									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.96 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DPTH TO T 108.03 FT.
LOGGED BY: M. Liberman	WELL DEVELOPMENT DATE:		SITE: 3



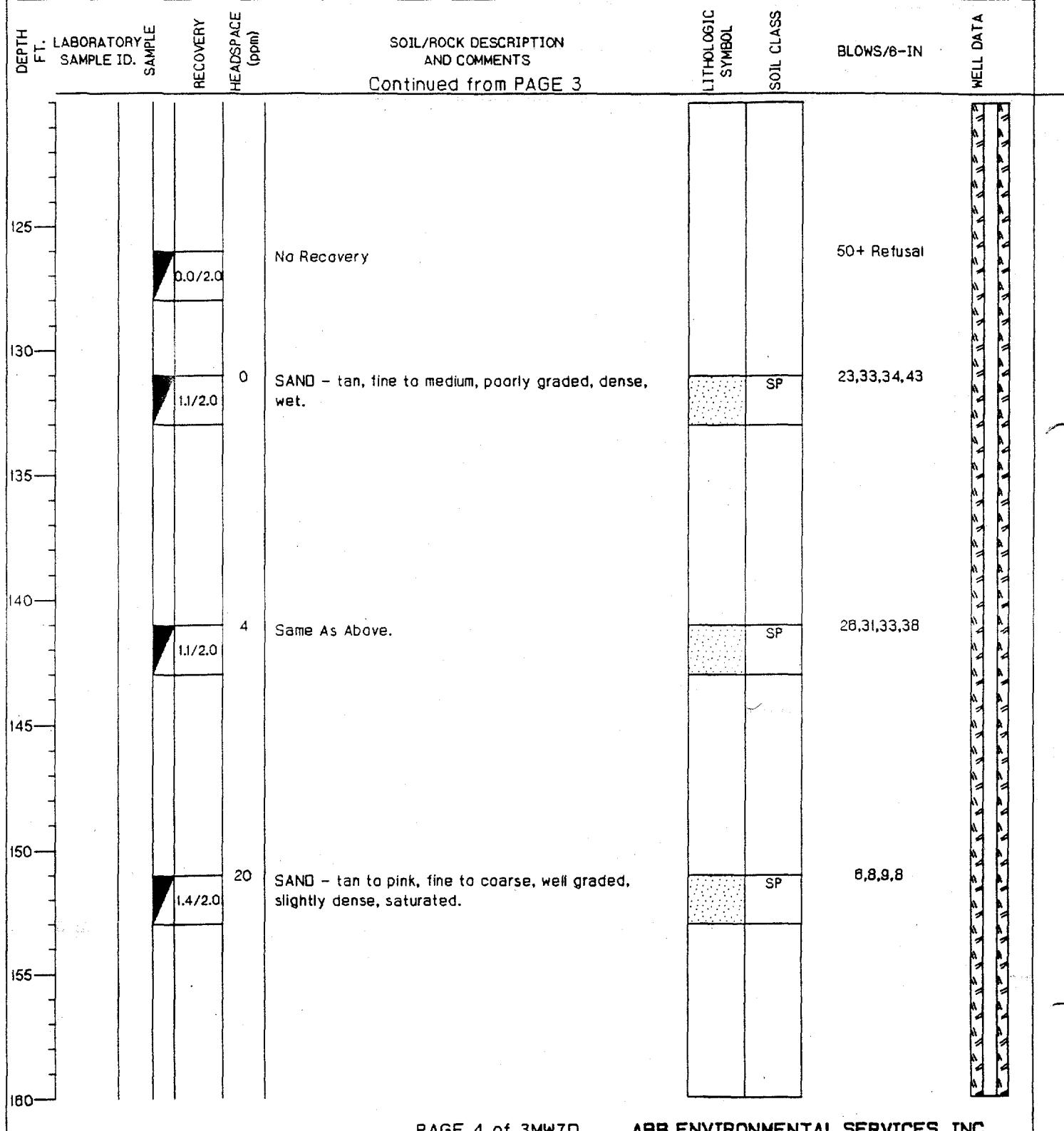
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-7D		BORING NO.				
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/22/93		COMPLTD: 5/25/93				
METHOD: MUD ROTARY		CASE SIZE: 2"		SCREEN INT.: 175-180 FT				
TOC ELEV.: 173.44 FT.		MONITOR INST.: FID/OVA		TOT DPTH: 180FT.				
LOGGED BY: M. Lieberman, E. Blomberg		WELL DEVELOPMENT DATE:		SITE: 3				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-3-2S FOR LOCAL LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								

TITLE: Naval Air Station Whiting Field		LOG OF WELL: WHF-3-70	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/22/93	COMPLTD: 5/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.44 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPHT TO 10.00 FT.
LOGGED BY: M. Lieberman, E. Bloomberg	WELL DEVELOPMENT DATE:	SITE: 3	



TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-7D		BORING NO.			
IENT: SOUTHNAVFACENGCOM					PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/22/93		COMPLTD: 5/25/93			
METHOD: MUD ROTARY			SCREEN INT: 175-180 FT		PROTECTION LEVEL: D			
TOC ELEV.: 173.44 FT.			MONITOR INST: FID/OVA		TOT DPTH: 180FT.			
LOGGED BY: M. Lieberman, E. Bloomberg			WELL DEVELOPMENT DATE:		SITE: 3			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2								
85			N/A	No Recovery			31,50,Refusl	
90			22	SAND - purple to yellow and buff, medium to coarse, slightly moist.	SP		19,22,47,48	
95			1	SAND - purple and gray mottled, fine, some silt, moist.	SP		3,3,4,4	
100			2.5	SAND - light brown, medium to coarse, well graded, little silt, Litho change at 1.5 ft Silty Clay - gray, slightly plastic, moist.	CL		9,14,8,15	
105			0.4	SILTY CLAY - gray to light purple, slightly plastic, dry.			7,8,9,10	
110			0.4	Same As Above.			8,5,5,7	
115			0.2	Same As Above - Bottom .5 ft - CLAY - light red, highly plastic, fat.			4,7,9,12	
120			0.2	CLAY - light red, highly plastic.			8,13,14,13	
			0.8	Same As Above.			9,13,17,18	
			18	SAND - yellow to off-white and pink, very fine to fine, some silt, poorly graded, moderately dense, moist.	SP		11,11,14,33	

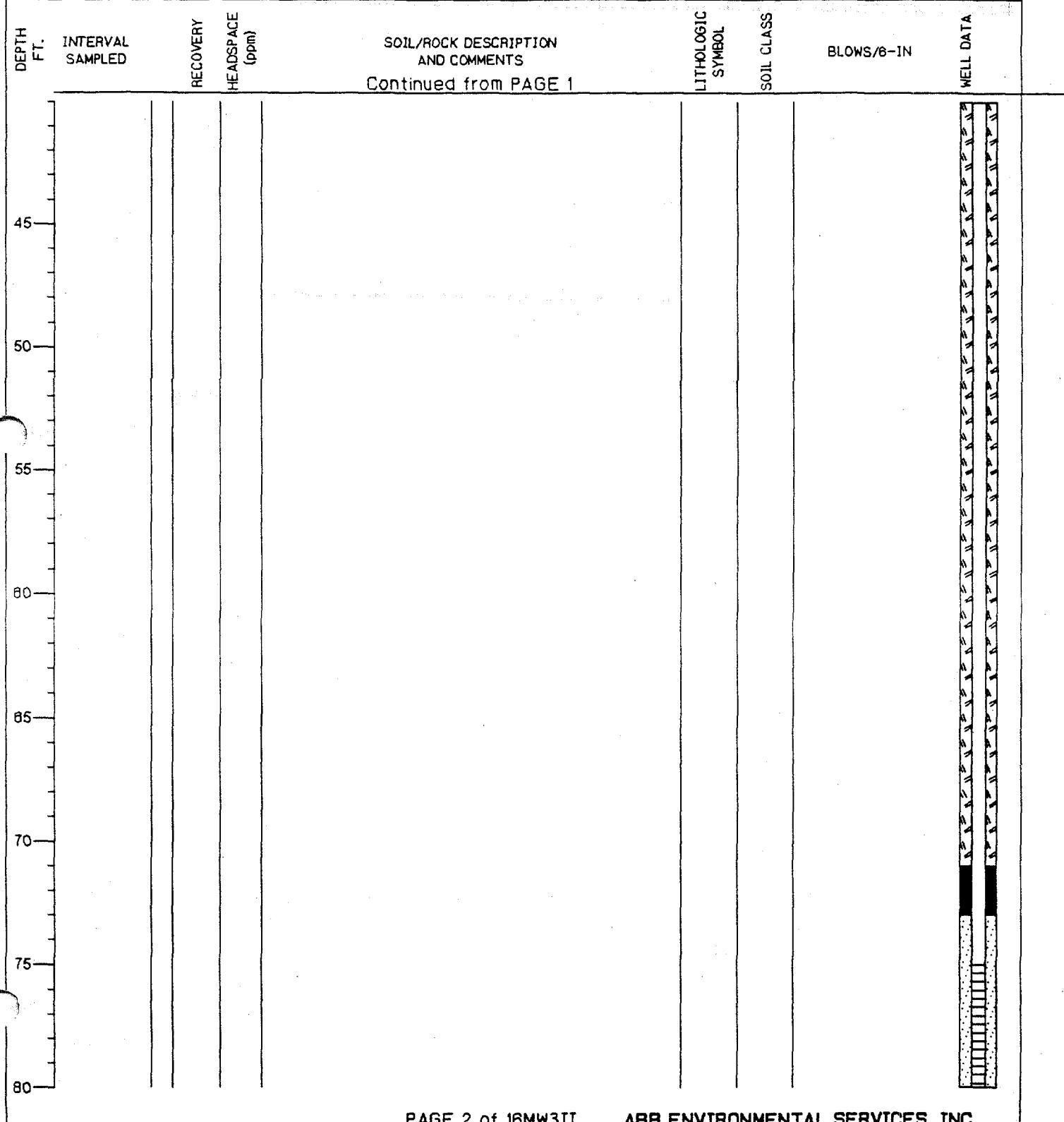
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-7D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/22/93	COMPLTD: 5/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT: 175-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.44 FT.	MONITOR INST: FIO/OVA	TOT DPTH: 180FT.	DPHT TO 104.81 FT.
LOGGED BY: M. Lieberman, E. Bloomberg	WELL DEVELOPMENT DATE:		SITE: 3



TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-7D	BORING NO.				
ENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/22/93	COMPLTD: 5/25/93				
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT	PROTECTION LEVEL: D					
TOC ELEV.: 173.44 FT.	MONITOR INST: FID/OVA	TOT DPTH: 180FT.	DPTH TO ↓ 104.81 FT.					
LOGGED BY: M. Lieberman, E. Bloomberg	WELL DEVELOPMENT DATE:		SITE: 3					
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 4								
185								
170								
175								
180								
185								
190								
195								
200								

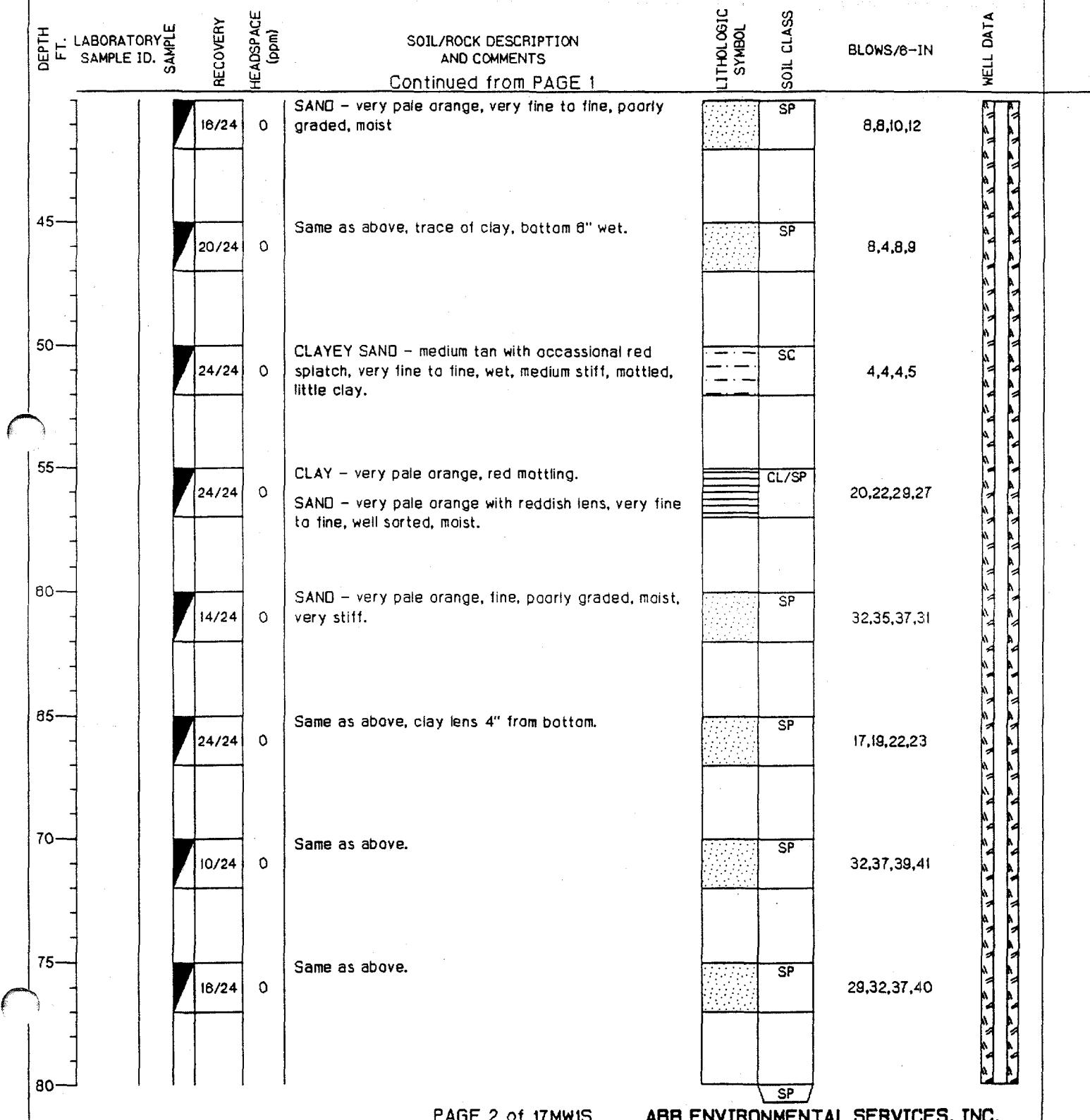
TITLE: NAVAL AIR STATION WHITING FIELD			LOG OF WELL: WHF-16-3II	BORING NO.				
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 01/25/93	COMPLTD: 01/25/93				
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT: 75-80 FT	PROTECTION LEVEL: 0					
TOC ELEV.: 51.31 FT.	MONITOR INST: OVA	TOT DPTH: 80FT.	DPTH TO 13.38 FT.					
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:			SITE: 16 - S.W. Landfill				
DEPTH FT.	INTERVAL SAMPLED	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-16-30 FOR LITHOLOGICAL DESCRIPTION.				
10								
15								
20								
25								
30								
35								
40								

TITLE: NAVAL AIR STATION WHITING FIELD	LOG of WELL: WHF-1B-3II	BORING NO.
ENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 01/25/93	COMPLTD: 01/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 75-80 FT PROTECTION LEVEL: 0
TOD ELEV.: 51.31 FT.	MONITOR INST: OVA	TOT DPTH: 80FT. DPTH TO T 13.38 FT.
LOGGED BY: W. Calby-George	WELL DEVELOPMENT DATE:	SITE: 1B - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD				LOG OF WELL: WHF-17-IS		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 7/18/93	COMPLTD: 7/27/93			
METHOD: MUD ROTARY	CASE SIZE: 8 1/2"		SCREEN INT: 98-113 FT	PROTECTION LEVEL: D				
TOC ELEV.: 195.49 FT.	MONITOR INST: OVA		TOT DPTH: 115FT.	DPTH TO T 111.45 FT.				
LOGGED BY: N. Roka/G. Walker	WELL DEVELOPMENT DATE:			SITE: I7 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN		
5	24/24	0.2	GRAVELLY SILT - red, firm to soft, moist.	GM		4,9,5,8		
10	18/24	0.3	SAND - red, fine, poorly graded, medium dense, moist.	SP		4,8,5,8		
15	14/24	BKG	SAND - light tan, fine to medium, poorly graded, medium dense, slightly moist, subrounded.	SP		7,10,11,18		
20	12/24	BKG	SAND - red, fine to medium, poorly graded, moderately dense to dense, subangular to angular.	SP		11,19,21,27		
25	16/24	0.2	SAND - whitish green to pink, very fine to fine, poorly graded, dense, dry.	SP		14,19,27,33		
30	12/24	0.1	SAND - pinkish tan, very fine to medium, poorly graded, dense, moist.	SP		11,23,24,28		
35	24/24	BKG	CLAY - gray to purple, fat, very plastic, soft.	CH		3,4,5,9		
40	21/24	0.3	CLAYEY SAND - purple, loose, soft, moist. SAND - very fine to fine, poorly graded, medium dense, damp.	SP		9,10,10,12		
				SP				

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-IS	BORING NO.
IDENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/16/93	COMPLTD: 7/27/93
METHOD: MUD ROTARY	CASE SIZE: 8"/2"	SCREEN INT: 98-113 FT	PROTECTION LEVEL: 0
TOC ELEV: 195.48 FT.	MONITOR INST: OVA	TOT DPTH: 115FT.	DPHT TO 7 111.45 FT.
LOGGED BY: N. Roka/G. Walker	WELL DEVELOPMENT DATE:	SITE: 17 - Fire Training	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-IS	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/18/93	COMPLTD: 7/27/93
METHOD: MUD ROTARY	CASE SIZE: 8"/2"	SCREEN INT: 98-113 FT	PROTECTION LEVEL: D
TOC ELEV.: 195.49 FT.	MONITOR INST: OVA	TOT DPTH: 115FT.	DPTH TO ↓ 111.45 FT.
LOGGED BY: N. Roka/G. Walker	WELL DEVELOPMENT DATE:		SITE: 17 - Fire Training

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2								
				Same as above, mottled moderate pink.		SP	20,19,32,43	
85	19/24	0		Same as above.		SP	31,37,41,43	
90	7/24	0		SAND - very pale orange, fine to medium, well sorted, wet, very dense.		SP	39,38,41,47	
95	18/24	0		SAND - very pale orange, fine to medium, well sorted, wet.		SP	48,50,-	
100	5/24	0		Same as above, saturated.		SP	49,50,50,-	
105	5/24	0		Same as above, angular to subangular sand particals.		SP	28,28,39,50	
110								
115								
120								

TITLE: NAVAL AIR STATION WHITING FIELD	LOG OF WELL: WHF-17-3	BORING NO. N/A
IDENT: SOUTHNAVACENGCOM		PROJECT NO: RI PHASE IIA

CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 7/13/93	COMPLTD: 7/14/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 109-124 FT
TOC ELEV.: 201.82 FT.	MONITOR INST: OVA	TOT DPTH: 125FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 17 - Fire Training

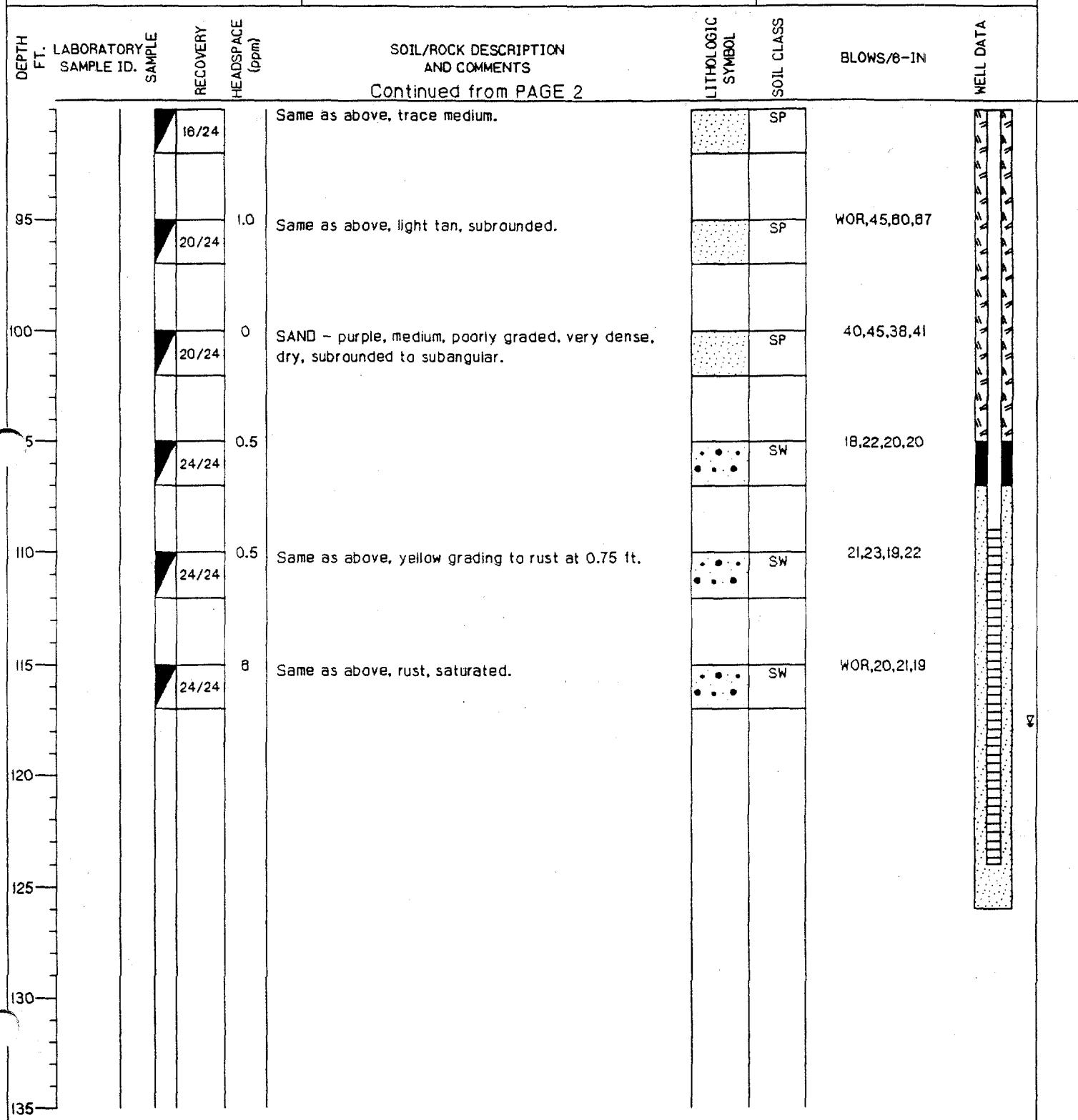
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SILTY SAND - orange, fine, poorly graded, loose, dry, subrounded.		SM	3,3,4,4	
10				CLAYEY SAND - red, fine, some silt, poorly graded, medium dense, dry, orange, mottling.		SC	3,7,8,II	
15				SILTY SAND - red, fine to medium, poorly graded, medium dense, dry, subrounded to subangular.		SM	7,II,7,9	
20				SAND - light orange, fine to medium, poorly graded, medium dense.		SP	4,8,14,20	
25				SAND - light yellow, fine to medium, poorly graded, medium dense, dry.		SP	7,10,14,18	
30								
35				SILTY SAND - light pink, trace clay, poorly graded, medium dense, moist, subrounded.		SM	15,II,10,II	
40				SAND - light pink, very fine to medium, poorly graded, medium dense, dry, subrounded.		SP	5,8,18,18	
45						SC	10,8,8,9	

TITLE: NAVAL AIR STATION WHITING FIELD			LOG OF WELL: WHF-17-3		BORING NO. N/A			
CLIENT: SOUTHNAVFACENGCOM					PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 7/13/93		COMPLTD: 7/14/93			
METHOD: HSA	CASE SIZE: 2 in.		SCREEN INT: 109-124 FT		PROTECTION LEVEL: 0			
TOD ELEV.: 201.82 FT.	MONITOR INST: OVA		TOT DPTH: 125FT.		DPTH TO T 117.7 FT.			
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:			SITE: 17 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1								
50		20/24	0.5	SANDY CLAY - light pink, fine to medium sand, moderately loose, slightly moist, low plasticity.	---	SC		
55		20/24	0.5	CLAY - gray, moderate plasticity, soft, slightly moist.	-----	SP	5,15,13,20	
60		24/24	0	SAND - white to orange, fine, poorly graded, dense, dry, subrounded.	.....	SP		
65		24/24	1.0	Same as above, very fine to fine.	.....	SP	WOR,13,20,27	
70		24/24	1.0	Same as above, fine to medium.	.....	SP	18,19,17,29	
75		24/24	0.5	SAND - fine to medium, poorly graded, medium dense, dry, subrounded.	.....	SP	12,12,18,22	
80		20/24	1.0	SILTY SAND - pinkish gray, medium dense.	.....	SP		
85		20/24	0.5	SAND - very fine to fine, poorly graded medium dense, dry, subrounded.	.....	SP	14,18,15,18	
90		20/24	1.0	SAND - pinkish gray to white, fine to medium, poorly graded, dense, dry, subangular.	.....	SP		
95		18/24	0.5	SAND - white to orange, very fine to fine, poorly graded, dense, dry, subrounded to subangular.	.....	SP	18,27,34,37	
100		22/24	0.5	SAND - gray, very fine to fine, poorly graded, dry, subrounded.	.....	SP	17,19,16,21	
105		18/24	1.0	SAND - light tan to pink, fine, poorly graded, very dense, dry, subangular.	.....	SP	14,22,35,28	
110			0.5		SP		12,17,30,44	

TITLE: NAVAL AIR STATION WHITING FIELD	LOG OF WELL: WHF-17-3	BORING NO. N/A
ENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 7/13/93	COMPLTD: 7/14/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 109-124 FT
TOC ELEV.: 201.82 FT.	MONITOR INST.: OVA	TOT DPTH: 125FT.
LOGGED BY: N. Raka	WELL DEVELOPMENT DATE:	SITE: 17 - Fire Training

**SOIL/ROCK DESCRIPTION
AND COMMENTS**

Continued from PAGE 2



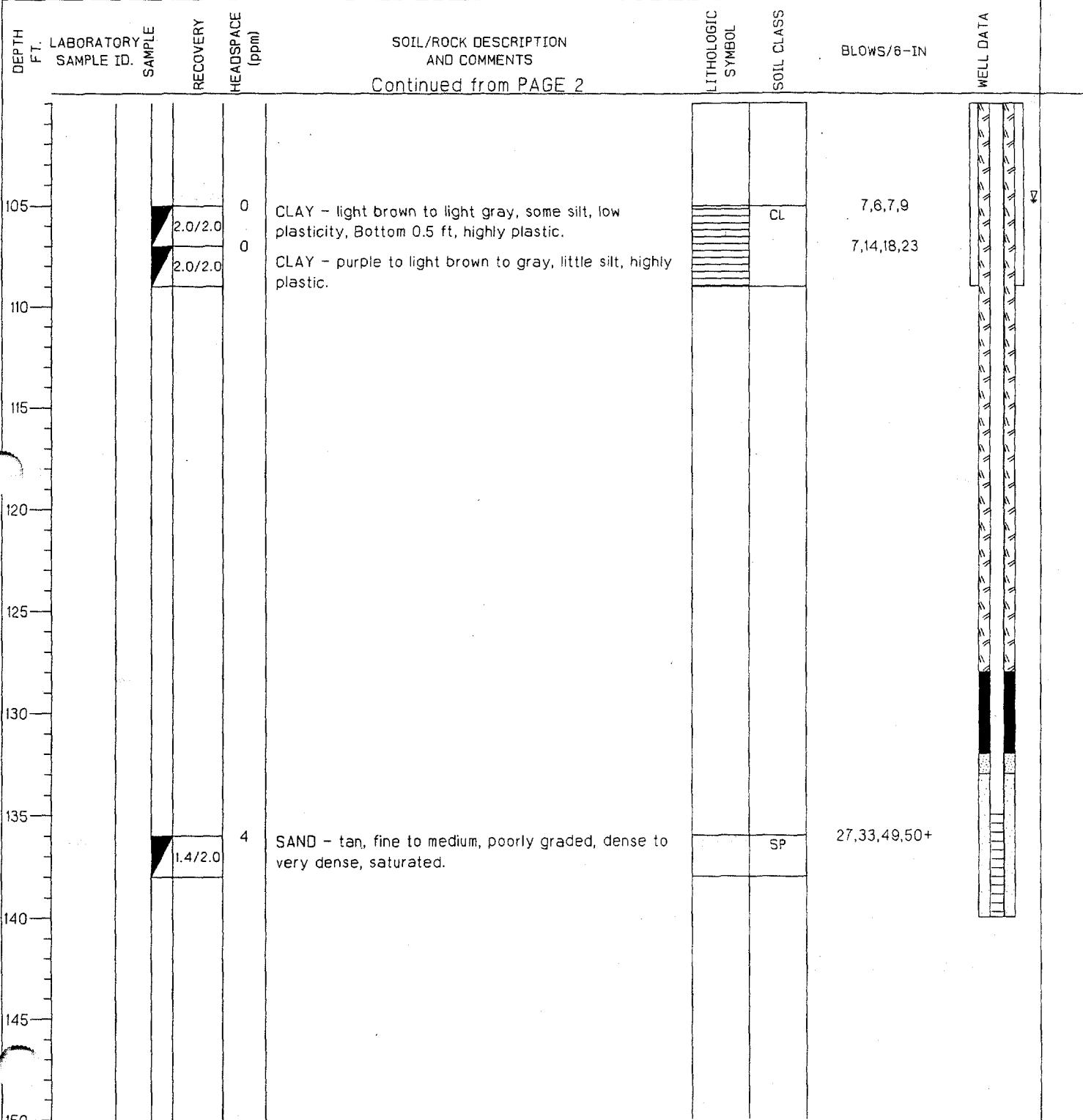
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-7I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/24/93	COMPLTD: 5/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 135-140 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.45 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DPTH TO 7 104.76 FT.
LOGGED BY: M. Lieberman	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-3-2S FOR LOCAL LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								
45								
50								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-7I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/24/93	COMPLTD: 5/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 135-140 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.45 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DPTH TO 104.76 FT.
LOGGED BY: M. Lieberman	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH F.T. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS			LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
			Continued from PAGE 1						
55									
60									
65									
70									
75									
80									
85									
90									
95									
100									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-71	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/24/93	COMPLTD: 5/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 135-140 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.45 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DPTH TO 104.76 FT.
LOGGED BY: M. Lieberman	WELL DEVELOPMENT DATE:	SITE: 3	

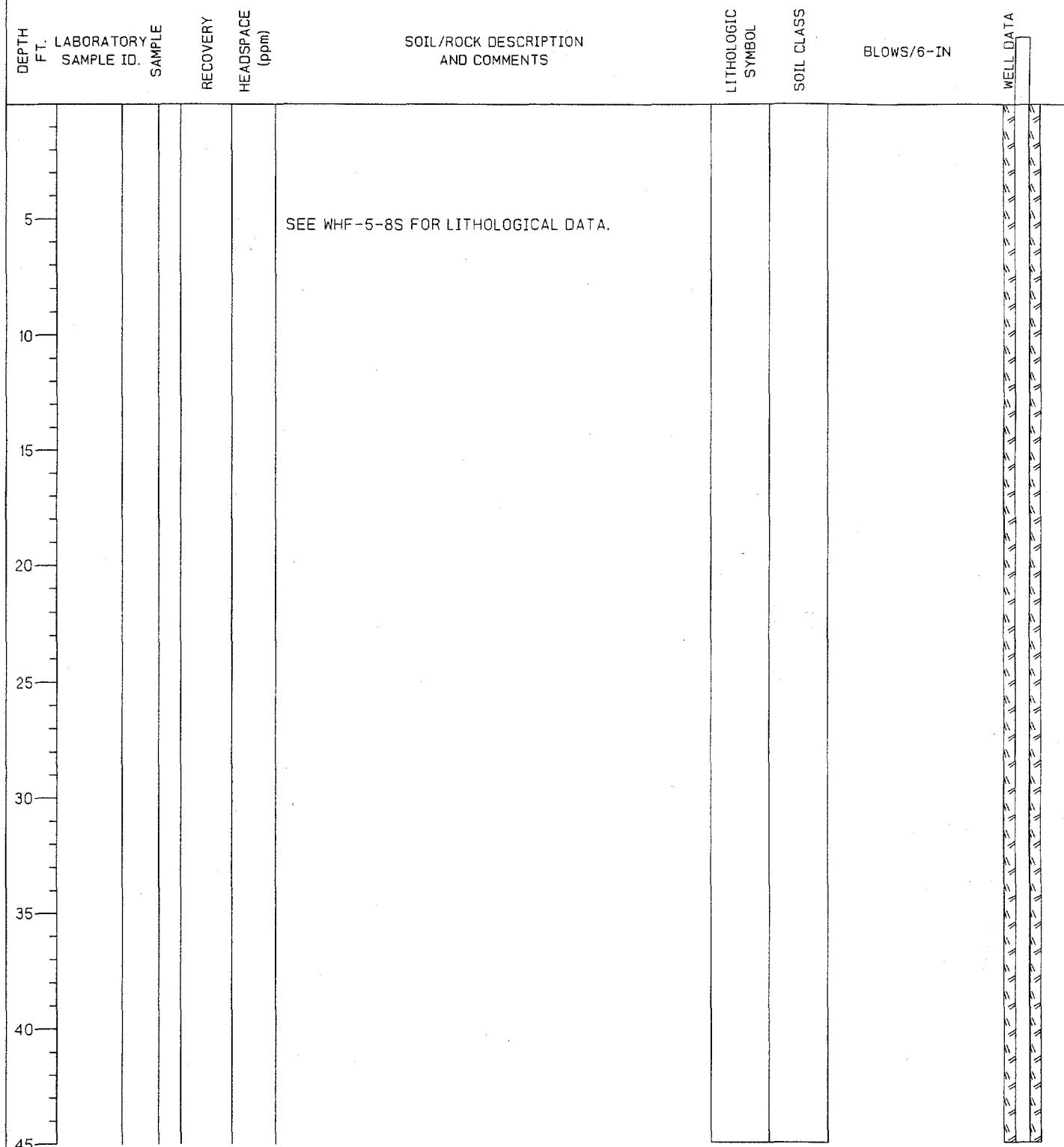


TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-3-7S		BORING NO.	
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 6/03/93		COMPLTD: 6/13/93	
METHOD: MUD ROTARY		CASE SIZE: 2"	SCREEN INT.: 113-123 FT	PROTECTION LEVEL: D		
TOC ELEV.: 173.46 FT.		MONITOR INST.: FID/OVA	TOT DPTH: 125FT.	DPTH TO V 104.96 FT.		
LOGGED BY: N. Roka		WELL DEVELOPMENT DATE:		SITE: 3		
DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS BLOWS/6-IN	WELL DATA
5			SEE WHF-3-2S FOR LOCAL LITHOLOGICAL DESCRIPTIONS.			
10						
15						
20						
25						
30						
35						
40						
45						
50						
55						
60						
65						

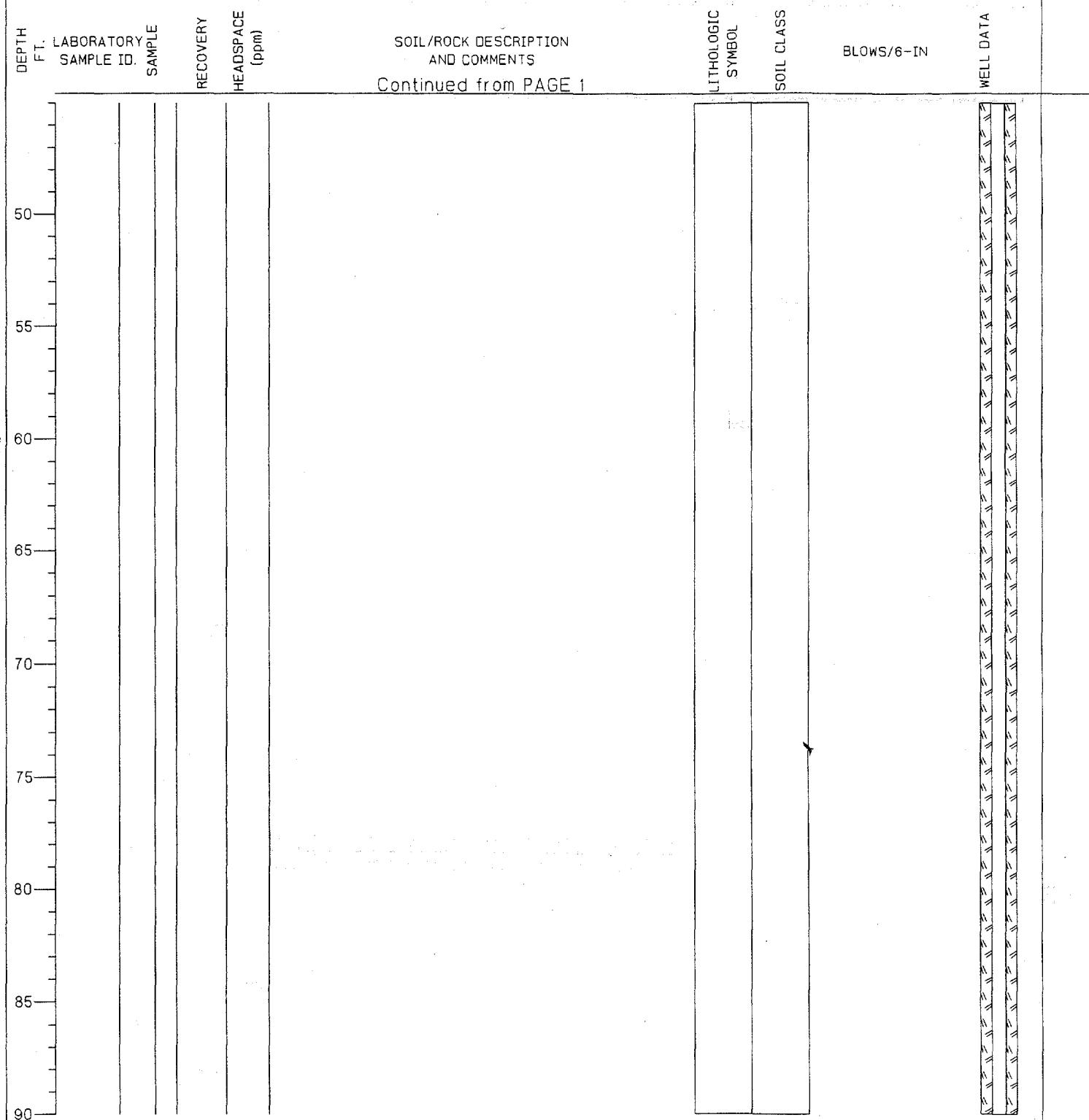
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-3-7S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/03/93	COMPLTD: 6/13/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 113-123 FT	PROTECTION LEVEL: D
TOC ELEV.: 173.46 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 125FT.	DPTH TO 104.96 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 3

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				Continued from PAGE 1					
70									
75									
80									
85									
90									
95									
100									
105									
110									
110	00/24	N/A		NO RECOVERY				8,10,16,20	
115	24/24	BKG		CLAY - light tan with gray mottled, red streaks, low plasticity, stiff , damp, little silt.			CH	10,12,15,21	
115	24/24	BKG					CL	15,17,17,22	
115	21/24	7		CLAYEY SAND - gray with some mottle brown, fine, firm, moderately dense, moist to wet.			SC	22,22,30,24	
120				SILTY SAND - light tan, fine, dense, saturated, subrounded.			SP		
125									
130									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/23/93	COMPLTD: 4/24/93
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 169.5' - 179.5'	PROTECTION LEVEL: Modified D
TOC ELEV.: 178.00 FT.	MONITOR INST.: FID	TOT DPTH: 179.5FT.	DPTH TO 111.99 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:		SITE: 5



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/23/93	COMPLTD: 4/24/93
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 169.5' - 179.5'	PROTECTION LEVEL: Modified D
TOC ELEV.: 178.00 FT.	MONITOR INST.: FID	TOT DPTH: 179.5FT.	DPTH TO 111.99 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:	SITE: 5	



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/23/93	COMPLTD: 4/24/93
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 169.5' - 179.5'	PROTECTION LEVEL: Modified D
TOC ELEV.: 178.00 FT.	MONITOR INST.: FID	TOT DPTH: 179.5FT.	DPTH TO ∇ H1.99 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:	SITE: 5	

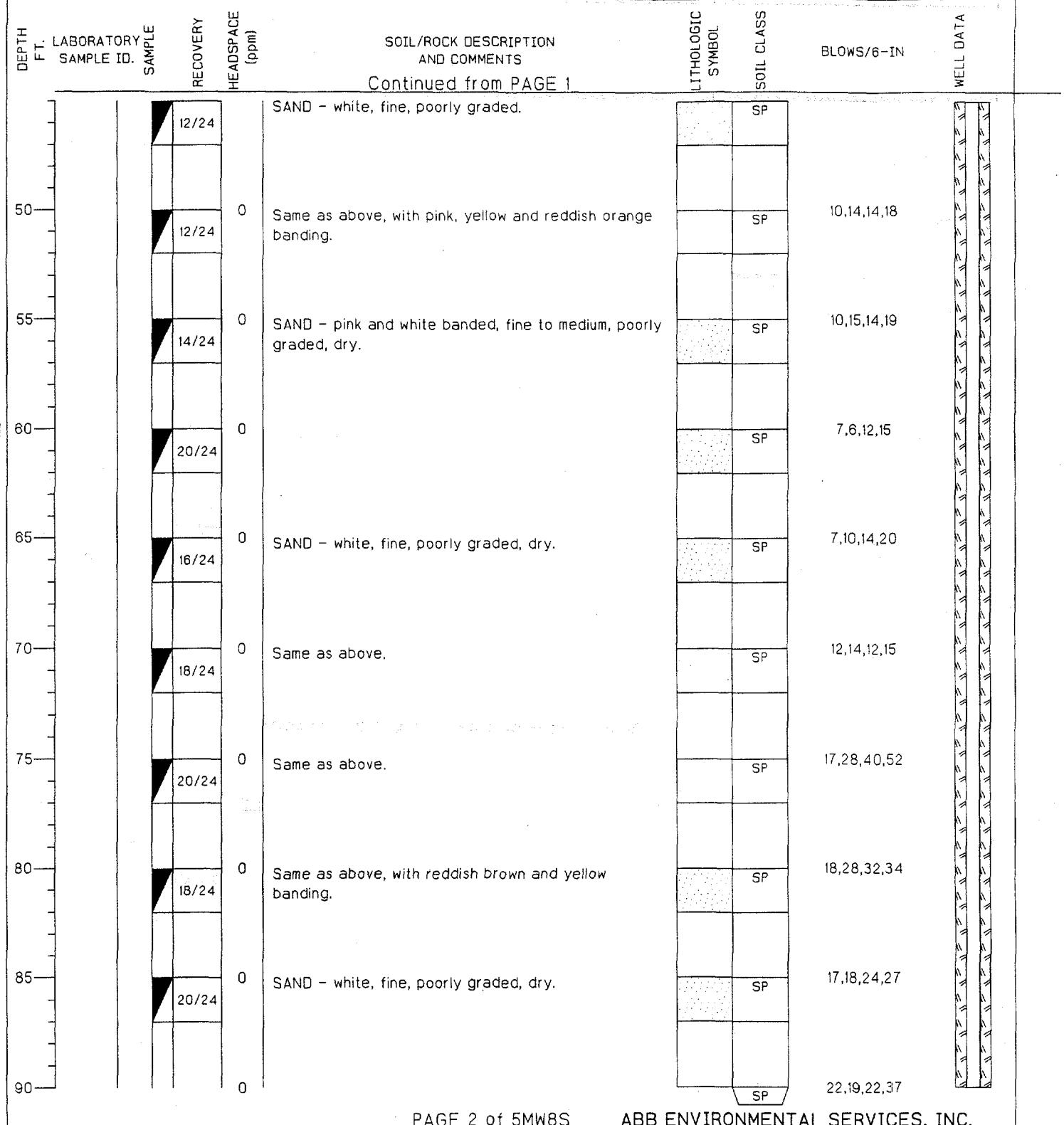
DEPTH F.T. SAMPLE	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				Continued from PAGE 2					
95									
100									
105									
110									
115									
120									
125									
130		1.6/2	NA	CLAYEY SAND/SANDY CLAY (interbeded) - maroon interbeded with yellow orange and light yellow, fine grained, trace to no silt, (Top 1.4'); saturated; over sand, off white, fine grained.		— —	SC	14,36,38,30	
135			NA			— —		22,26,31,29	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/23/93	COMPLTD: 4/24/93
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 169.5' - 179.5'	PROTECTION LEVEL: Modified D
TOC ELEV.: 178.00 FT.	MONITOR INST.: FID	TOT DPTH: 179.5FT.	DPHTH TO 111.99 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:	SITE: 5	

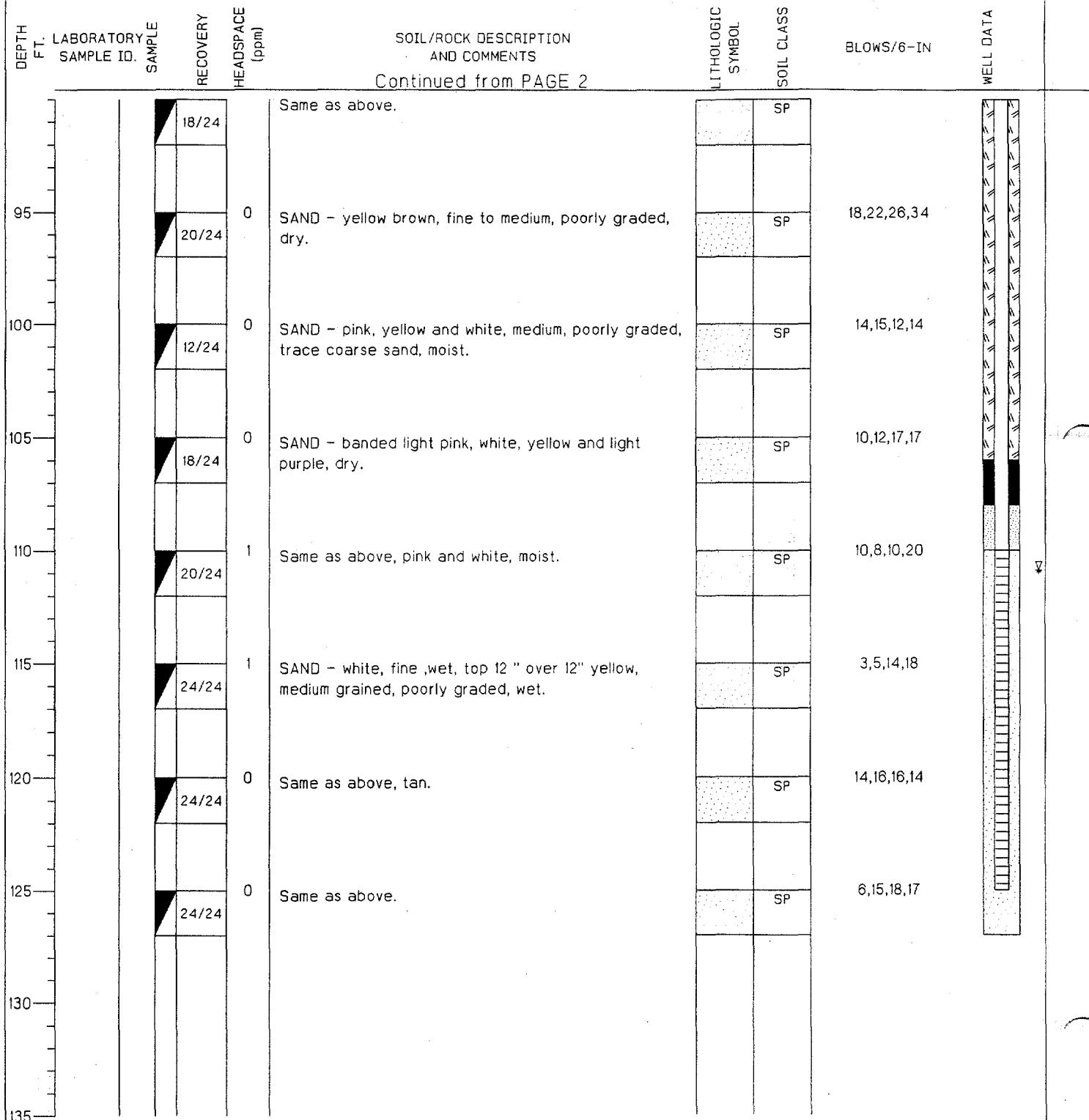
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 3								
			0.9/2	SAND - v. pale red to light tan, fine grained dry, firmly packed, poorly graded, wet.		SP		
140			0.8/2	NA SAND - red to pale red, fine and very fine grains, poorly graded, wet.		SP	27,28,33,37	
145								
150			0.5/2	NA SAND - pale orange, fine grained, dense, trace gravel, wet.		SP	37,39,42,38	
155			0.8/2	NA Same as above (0.4'), V. pale red, no gravel over CLAYEY SAND (0.4'), V. pale grey with interbedded red layers.		SP	42,49,50,R	
160								
165				NA SAND - v. pale red and pale red, fine to medium grained, overlain by medium to coarse sand, wet.		SP	18,19,22,15	
170			0.6/2	NA SAND - light tan, fine grained, sub-rounded, trace red consolidated silt (pockets).		SP	38,50,40,42	
175				NA Same as above, light tan to beige, trace coarse sand.		SP	41,48,>50	
180								

TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-5-8S		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 3/21/93	COMPLTD: 3/23/93			
METHOD: Hollow Stem Auger	CASE SIZE: 2"		SCREEN INT.: 110' - 125'		PROTECTION LEVEL: D			
TOC ELEV.: 177.73 FT.	MONITOR INST.: FID/OVA		TOT DPTH: 125FT.		DPTH TO V 110.91 FT.			
LOGGED BY: Richard Nelson	WELL DEVELOPMENT DATE:			SITE: 5				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0	SAND - light brown, fine to medium, poorly graded, moist, trace silt.	SP		2,3,8,7	
10			0	SAND - reddish brown and light brown, fine to medium, poorly graded, slightly moist, trace silt.	SP		4,6,12,12	
15			NA	CLAY - grey and pinkish red, stiff, plastic, dry.	CH		6,7,10,17	
20			0	Same as above (Top 6'), wet. SAND - white, fine, poorly graded, with thin orange lamina, dry.	CH/SP		4,7,9,12	
25			0	SAND - grey, yellow and tan, fine, poorly graded, wet.	SP		7,6,6,10	
30			0	SAND - white, fine, 1/2' yellow band at 31', dry.	SP		7,11,10,11	
35			0	CLAY (Top 4")- grey, stiff, plastic, trace sand. SAND - white, fine, poorly graded, dry.	CH/SP		9,8,7,9	
40			0	Same as above.	SP		10,9,10,9	
45			0		SP		8,8,8,9	

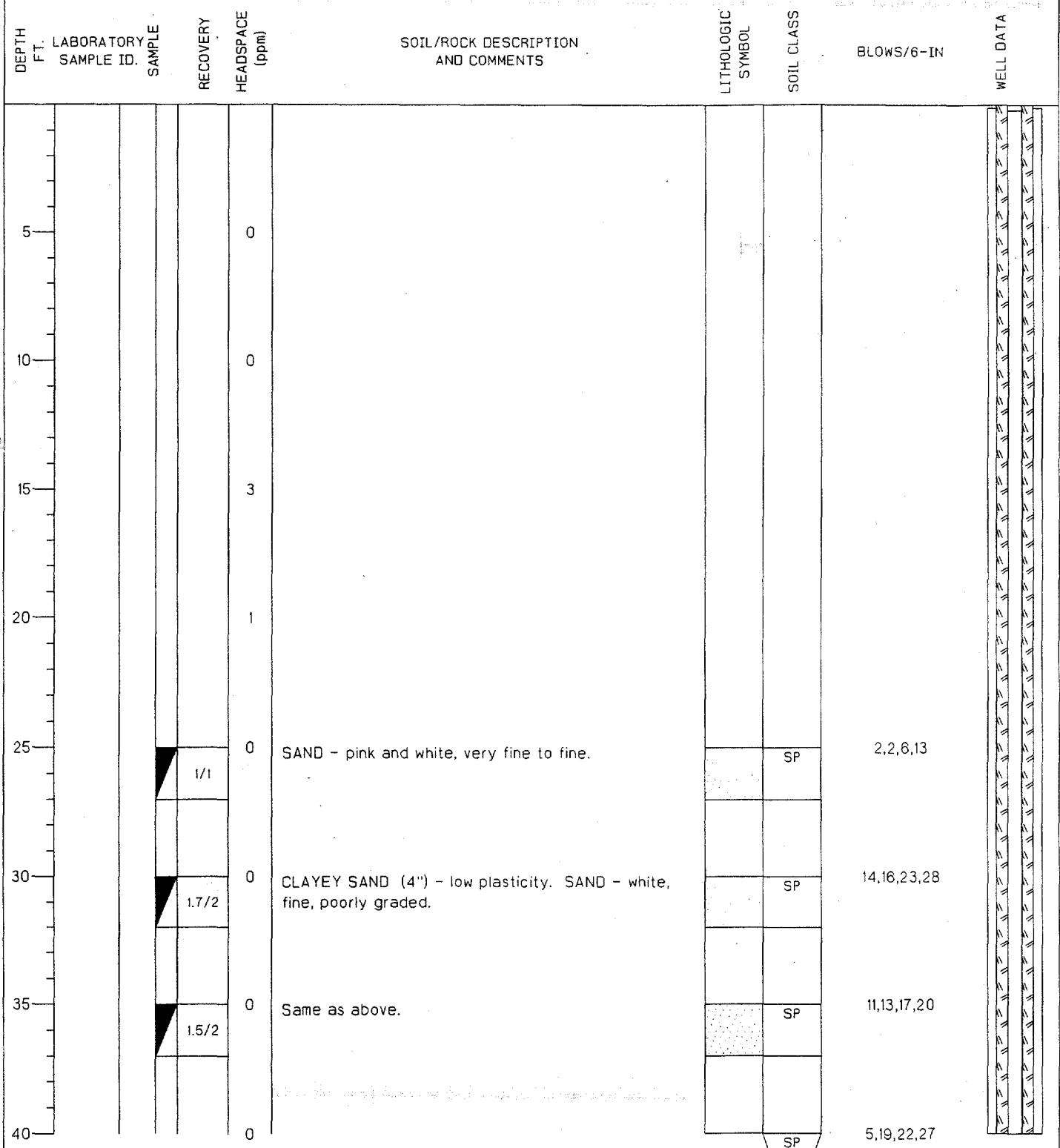
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/21/93	COMPLTD: 3/23/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 110' - 125'	PROTECTION LEVEL: D
TOC ELEV.: 177.73 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 125FT.	DPHT TO 110.91 FT.
LOGGED BY: Richard Nelson	WELL DEVELOPMENT DATE:		SITE: 5



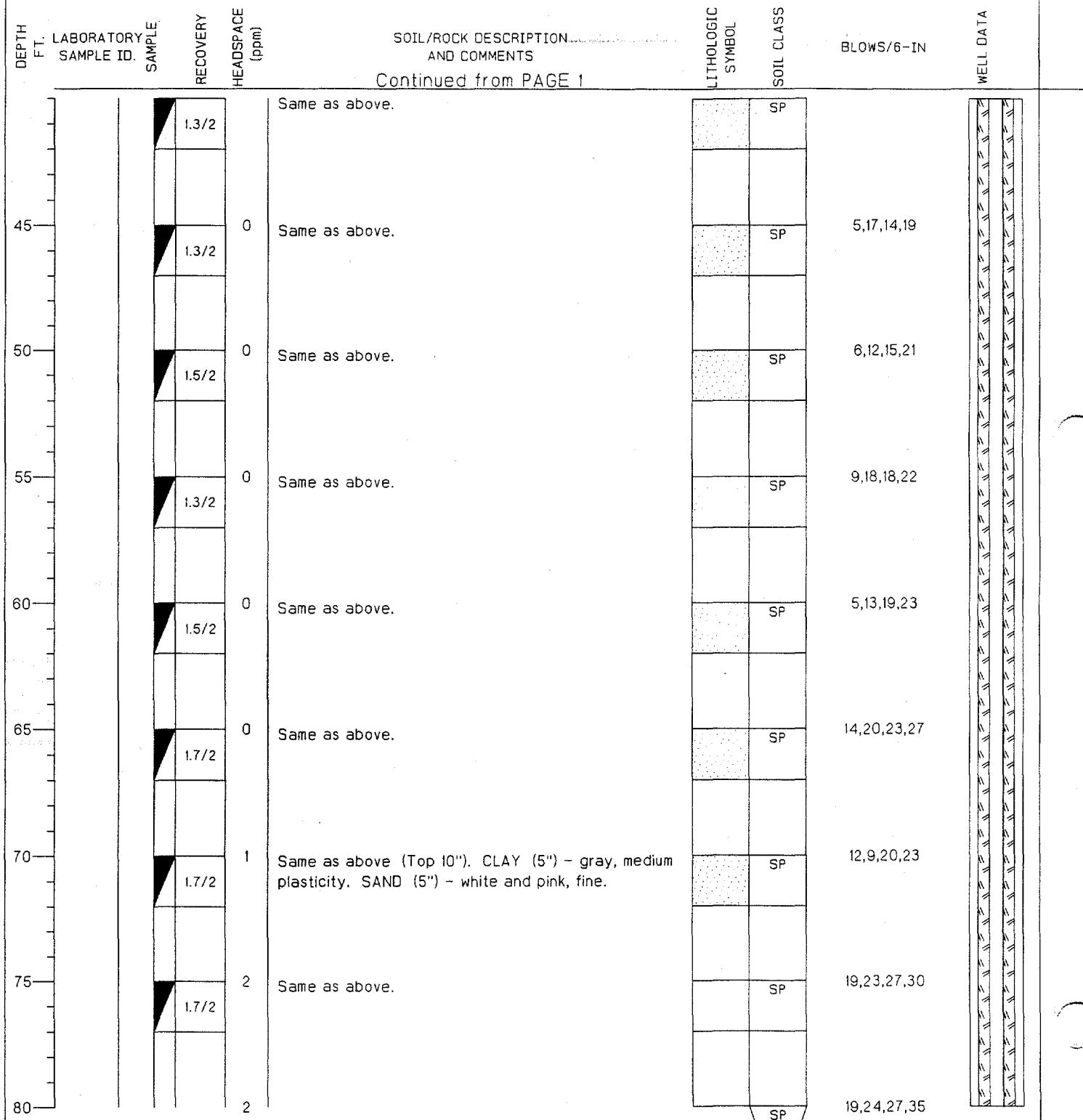
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-8S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/21/93	COMPLTD: 3/23/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 110' - 125'	PROTECTION LEVEL: D
TOC ELEV.: 177.73 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 125FT.	DEPTH TO 110.91 FT.
LOGGED BY: Richard Nelson	WELL DEVELOPMENT DATE:		SITE: 5



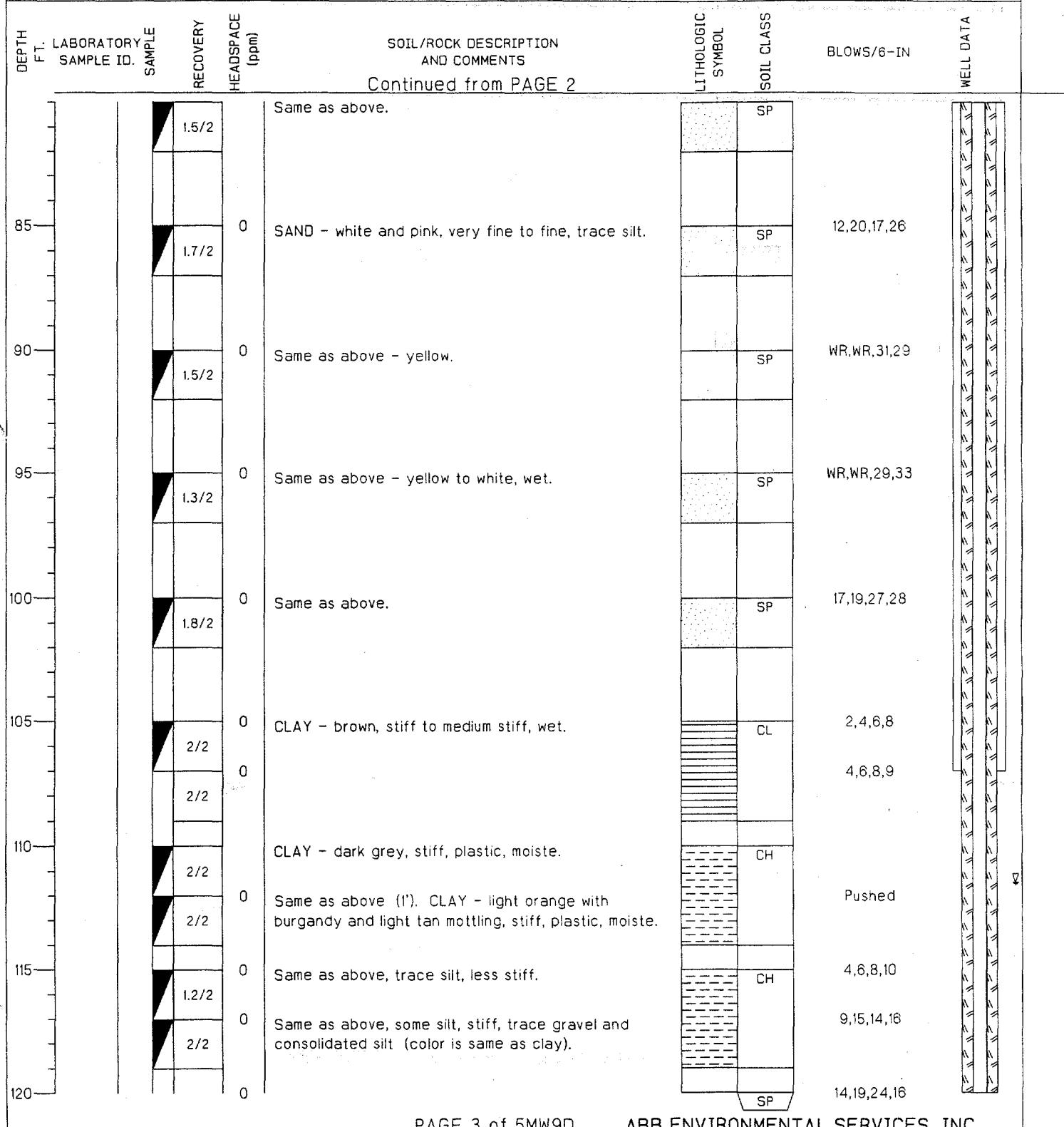
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/21/93	COMPLTD: 4/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170' - 180'	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.35 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPTH TO ∇ 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5



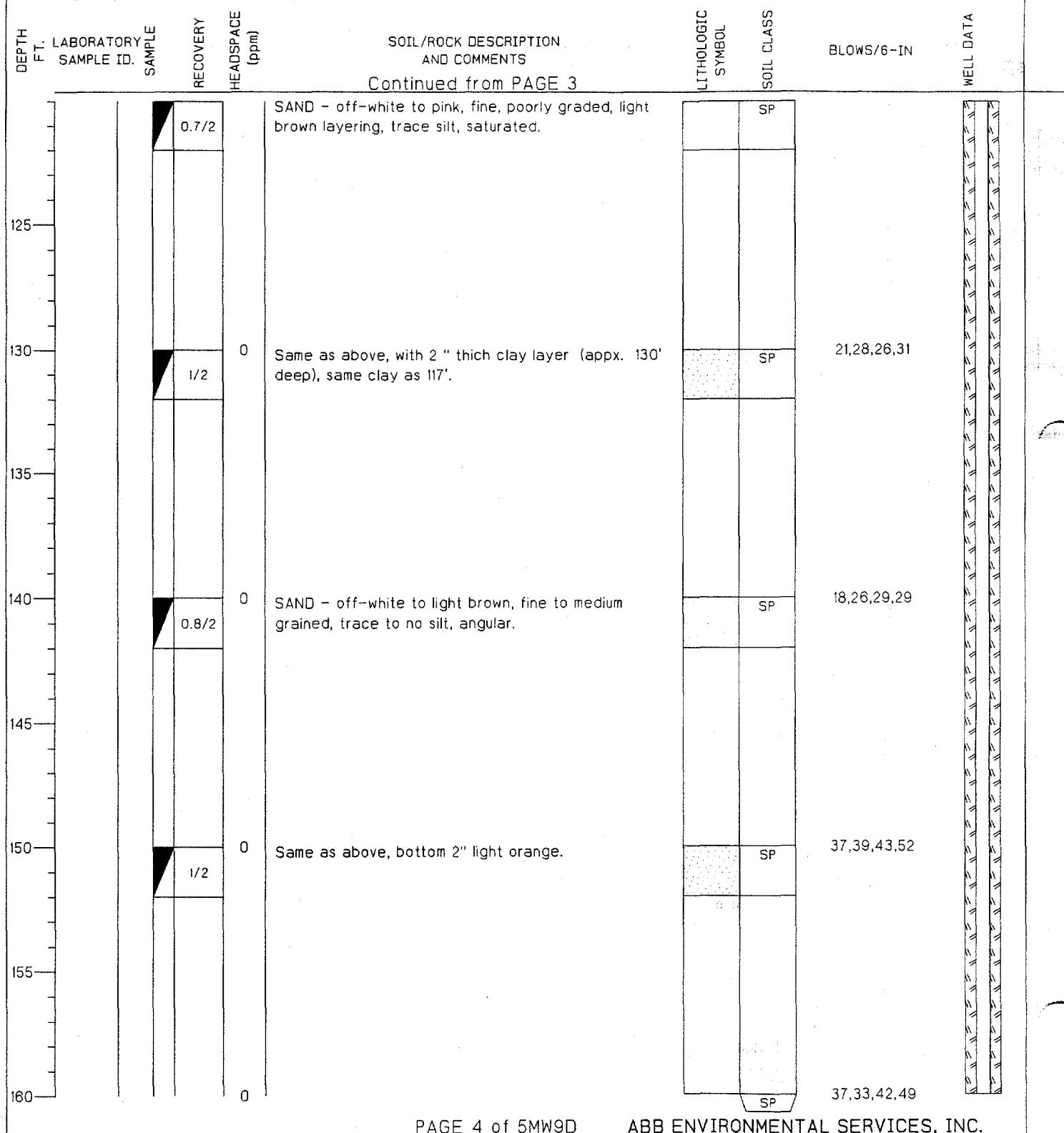
TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-5-90	BORING NO.
CLIENT: SOUTHNAVFACENGCOM	PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 4/21/93	COMPLTD: 4/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170' - 180'
TOC ELEV.: 176.35 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5



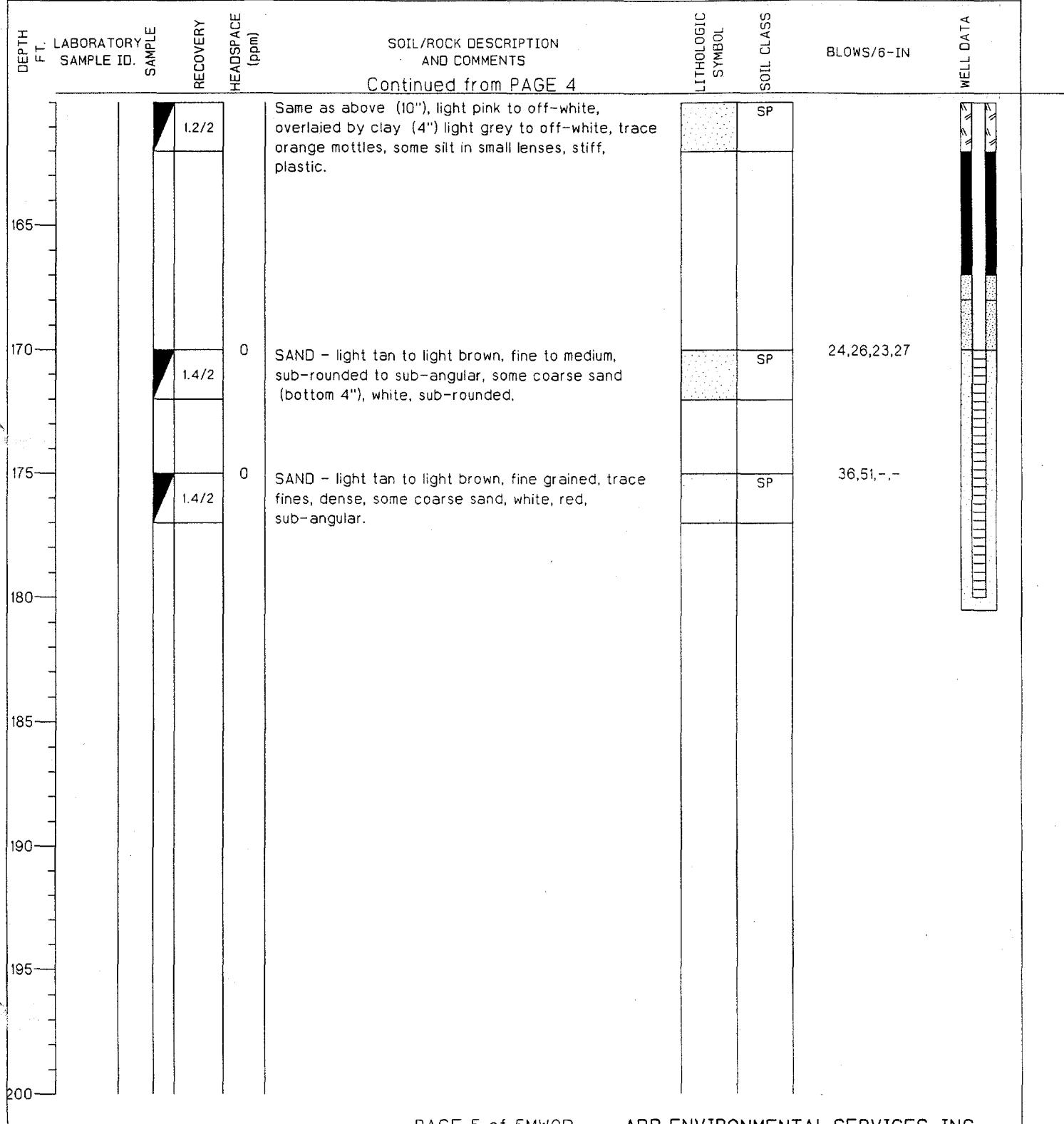
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/21/93	COMPLTD: 4/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170' - 180'	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.35 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPTH TO V 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/21/93	COMPLTD: 4/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170' - 180'	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.35 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPTH TO ∇ 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5



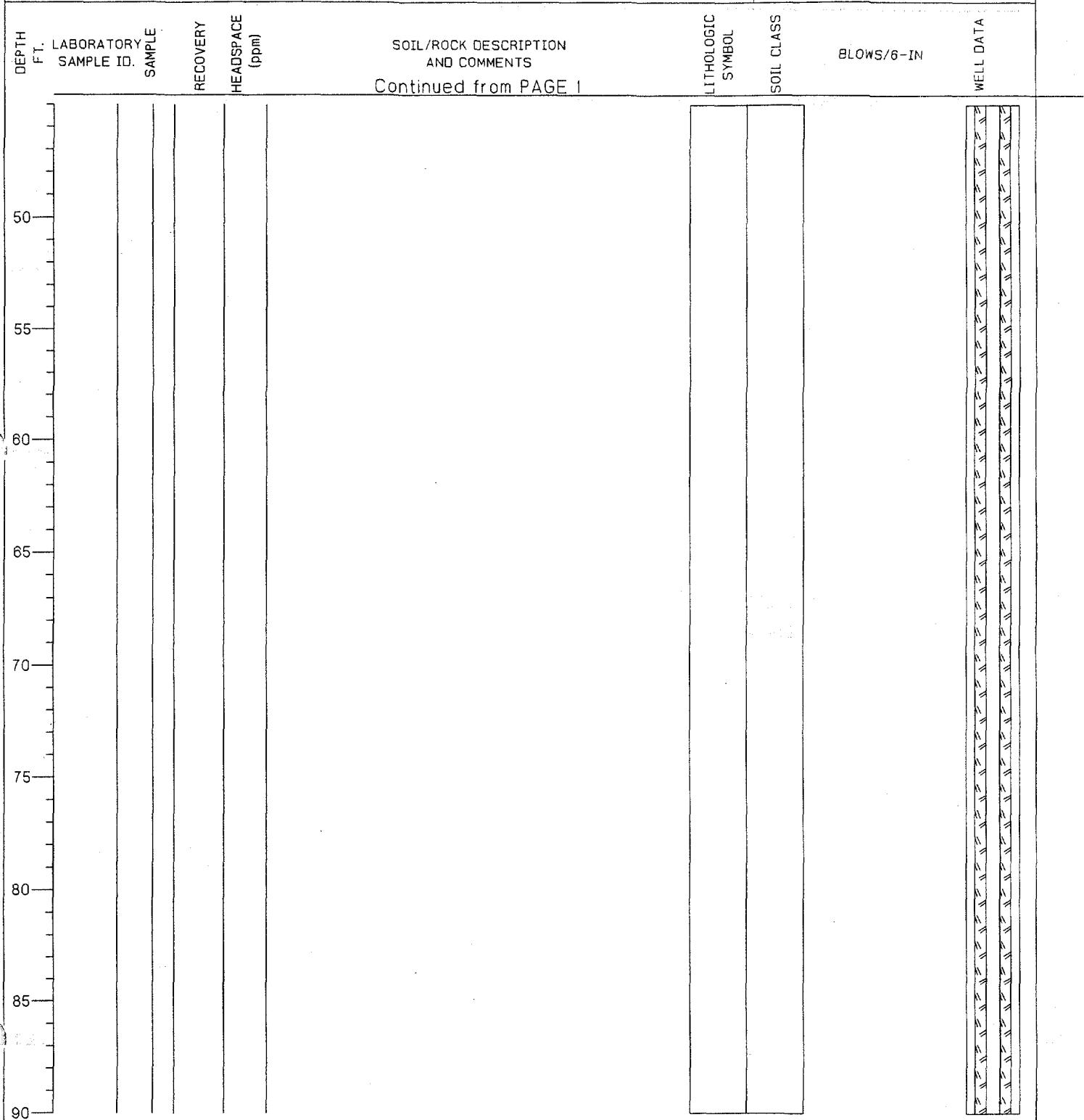
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/21/93	COMPLTD: 4/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170' - 180'	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.35 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180FT.	DPTH TO ∇ 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5



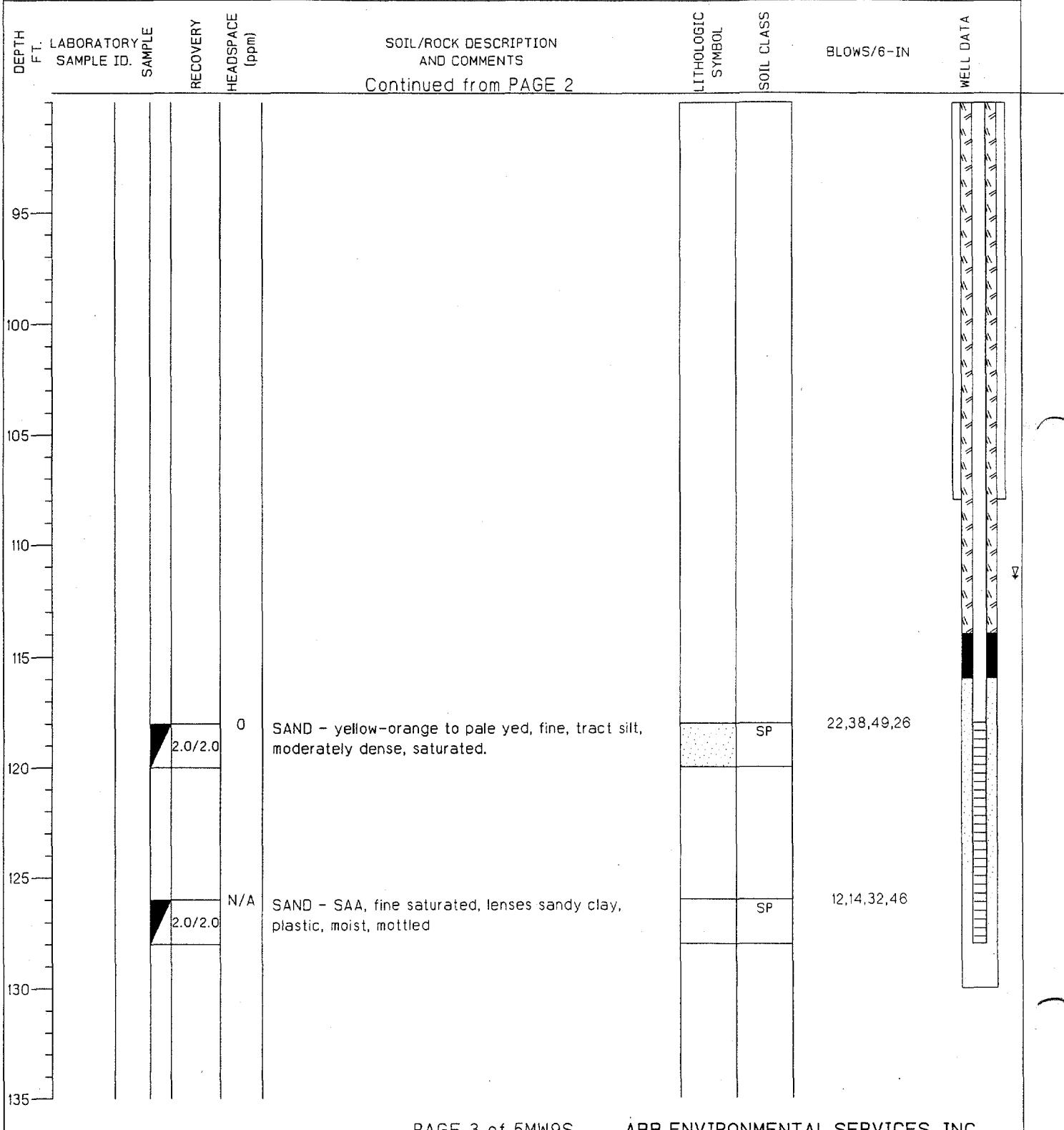
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/22/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 119-129'	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.83 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 131FT.	DPTH TO ∇ 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-5-9D FOR LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								
45								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/22/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 119-129'	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.83 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 131FT.	DPHTH TO 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5	



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-9S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/22/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 119-129'	PROTECTION LEVEL: Modified D
TOC ELEV.: 175.83 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 131FT.	DEPTH TO 111.47 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5	



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/11/93	COMPLTD: 4/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 184.55 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180.5FT.	DPTH TO ∇ 121.37 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5	

DEPTH F.T. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5							
10							
15							
20							
25							
30							
35							
40							
45							
N/A	SEE WHF-5-10S FOR ADDITIONAL LITHOLOGICAL DESCRIPTIONS.						

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/11/93	COMPLTD: 4/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 184.55 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180.5FT.	DPTH TO 121.37 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5

DEPTH F.T. SAMPLE	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS Continued from PAGE 1	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
51								
56								
61								
66								
71								
76								
81								
86								
91								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/11/93	COMPLTD: 4/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 184.55 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180.5FT.	DEPTH TO 121.37 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
97									
102									
107									
112									
117									
122	24/24		0/0		CLAY - black, medium stiff, plastic.	---	CH	5,7,7,12	
122	24/24		0/0		Same as above, dark gray.	----		10,10,10,15	
122	24/24		0/0		Same as above, olive gray.	----		10,8,10,11	
127	24/24		0/0		Same as above, olive gray, trace sand, very fine.	----		7,6,9,11	
127	24/24		0/<1		CLAY - pale yellowish orange and purple, mottled, medium stiff, lenses of very fine sand.	----		7,8,9,12	
132	24/24		0/0		Same as above.	----		5,5,8,12	
132	18/24		0/2.5		SAND - fine.	SP		21,28,31,31	
137					SAND - reddish brown to yellowish orange, pinkish white on bottom, fine to trace medium, poorly graded, saturated.				

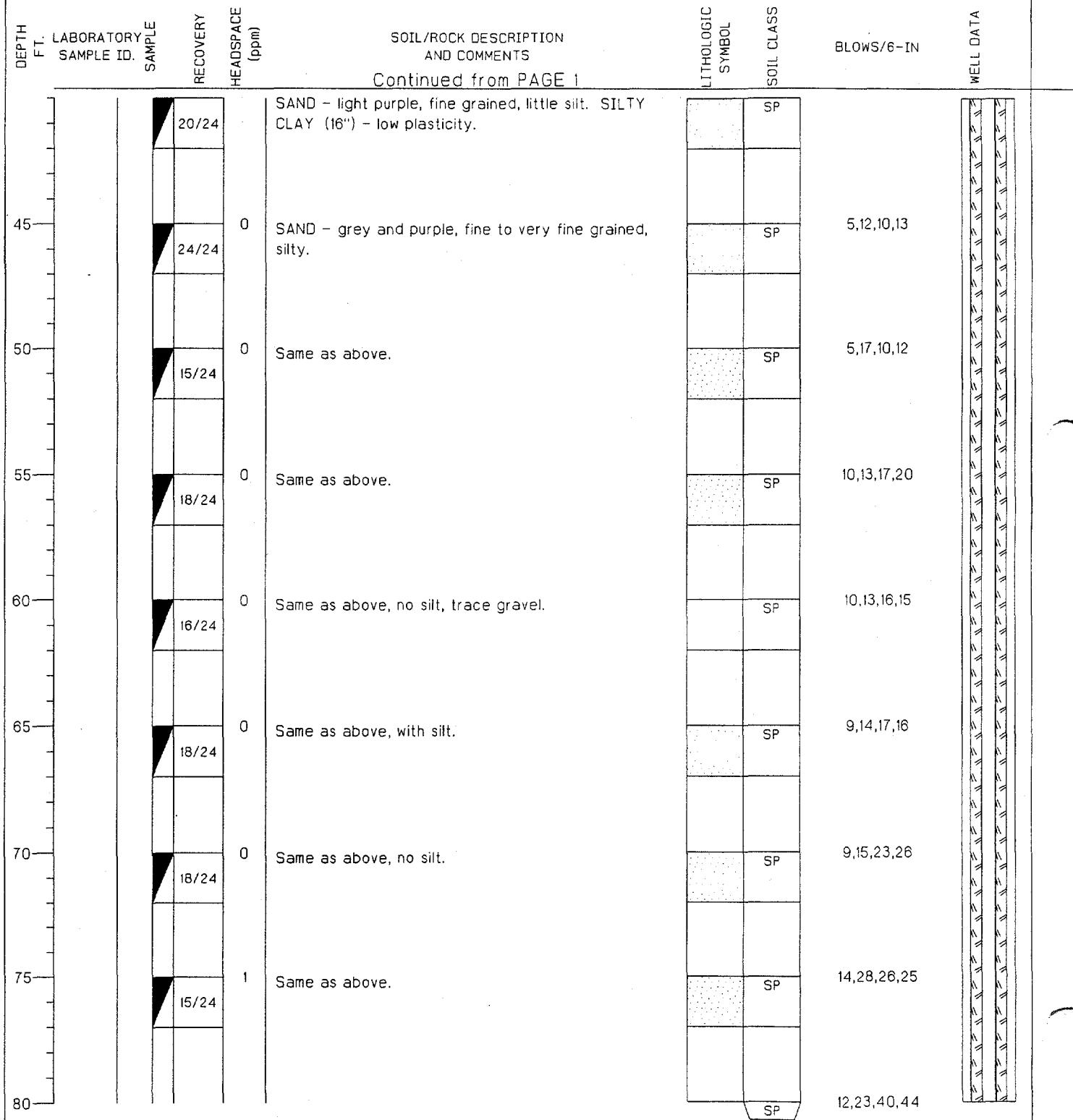
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/11/93	COMPLTD: 4/12/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 170-180 FT	PROTECTION LEVEL: D
TOC ELEV.: 184.55 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 180.5FT.	DPTH TO 121.37 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				Continued from PAGE 3					
143		22/24	0/0	SAND - light tan, medium to trace coarse, poorly graded, saturated. CLAY - yellowish orange to pale purple, mottle with yellowish orange, fine sand lenses (<1").		SP		20,17,14,?	
148		00/24	NA	SAND - pinkish white, fine to trace medium, poorly graded, saturated. NO RECOVERY				19,86,94,92	
153		16/24	0/<1	SAND - light tan to pinkish white, fine to medium, trace coarse, poorly graded, saturated.		SP		20,20,21,26	
158		24/24	0/0	SANDY CLAY - gray and pink mottling. CLAYEY SAND - light pink to gray.		SC SP		5,23,31,32	
163		3/24	0/0	SAND - pinkish white, very fine to fine, poorly graded, saturated. SAND - light tan, fine, poorly graded, saturated.		SP		25,38,40,49	
168		8/24	0/<1	Same as above.		SP		32,54,50,?	
173		8/24	0/7	SAND - tan, fine, poorly graded, saturated. SAND - silt, fine to coarse, well graded, saturated.		SP		17,17,29,22	
178		18/24	0/0	SAND - tan, fine, poorly graded, saturated.		SP		23,40,36,32	
183									

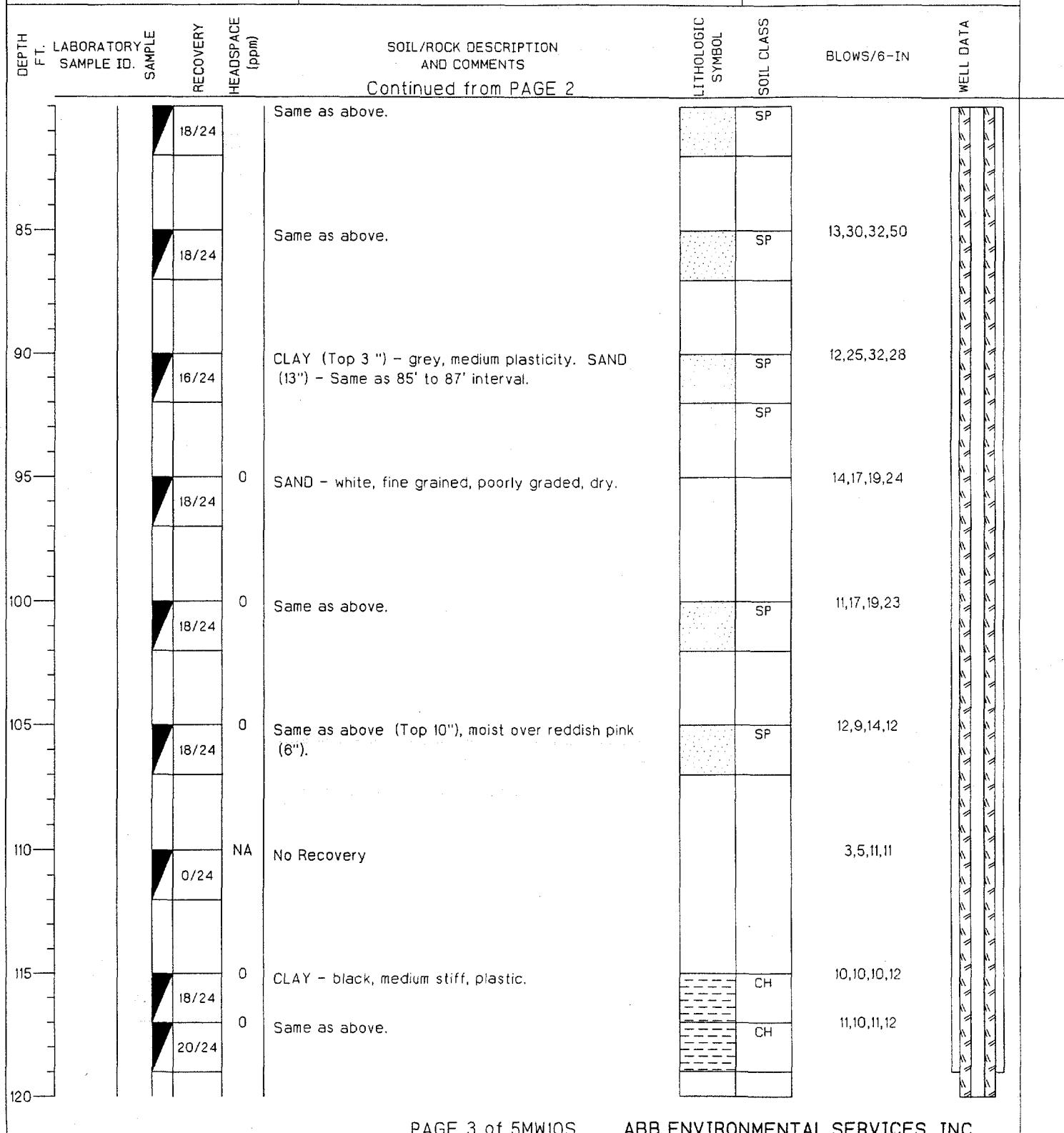
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/13/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 130-140 ft.	PROTECTION LEVEL: D
TOC ELEV.: 184.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DPHT TO 121.03 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5	

DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5	20/24	0	SAND - reddish brown, fine, silty, low plasticity.	SP		3,4,4,3	
10	22/24	0	Same as above.	SP		3,3,3,5	
15	18/24	0	Same as above.	SP		1,6,5,9	
20	20/24	0	Same as above.	SP		4,6,8,7	
25	22/24	0	Same as above, more coarse sand, less silt.	SP		6,8,13,14	
30	18/24	0	SILTY SAND (Top 3") - white, fine, wet. SILTY CLAY (6") - purple, low plasticity. SILTY SAND (9") - white and pink, very fine grained, dry.	SP		5,4,14,17	
35	18/24	0	CLAY (TOP 6") - grey, very plastic. SAND (12") - white and reddish brown, medium to fine grained.	SP		8,12,15,16	
40		0		SP		13,13,11,10	

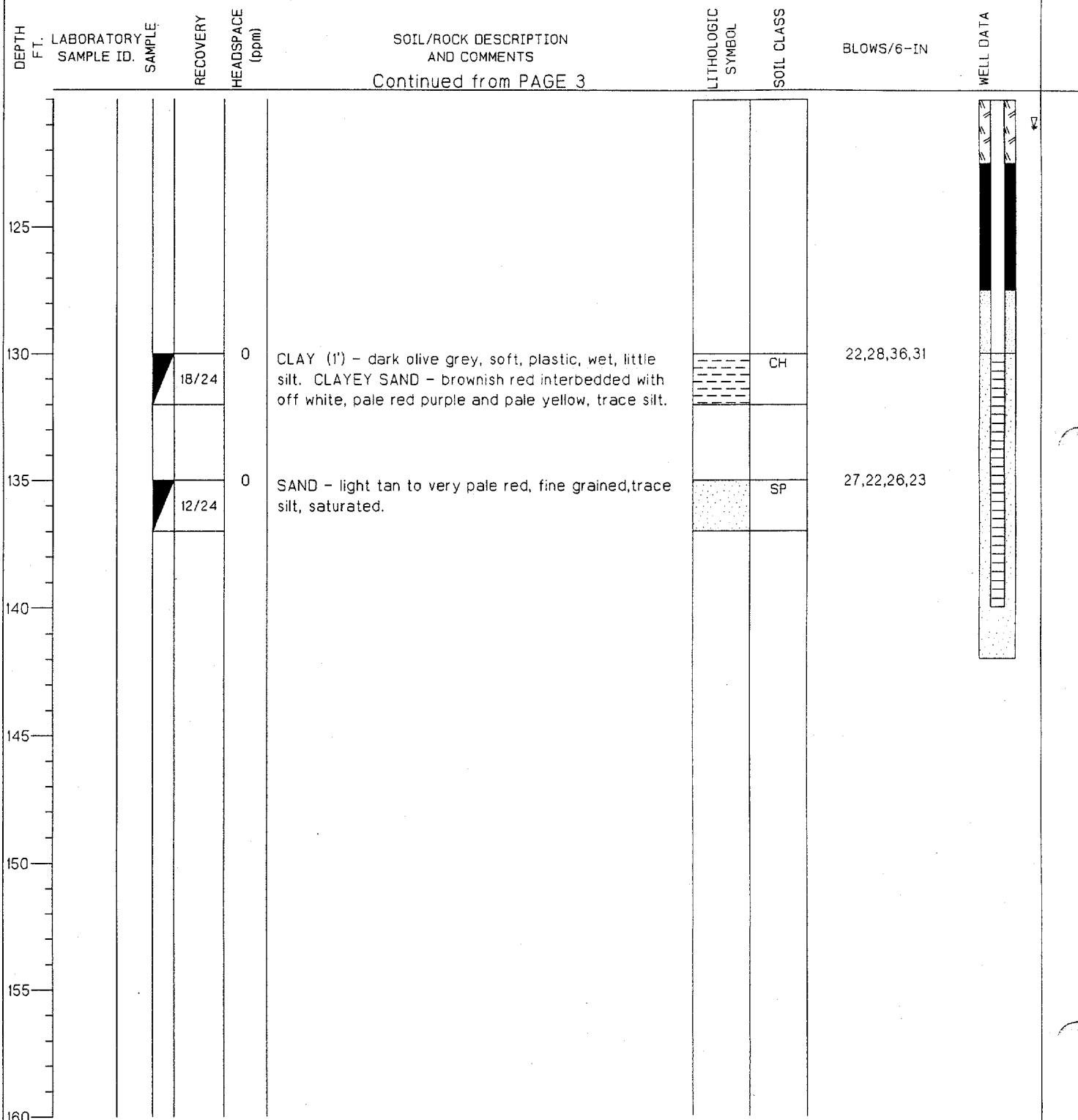
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/13/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 130-140 ft.	PROTECTION LEVEL: D
TOC ELEV.: 184.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DEPTH TO 121.03 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 5



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-5-10S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 4/13/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 130-140 ft.	PROTECTION LEVEL: D
TOC ELEV.: 184.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT.	DPTH TO 121.03 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5	



TITLE: Naval Air Station Whiting Field.	LOG of WELL: WHF-5-10S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM	PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 4/13/93	COMPLTD: 4/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 130-140 ft. PROTECTION LEVEL: D
TOC ELEV.: 184.21 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 140FT. DPTH TO 121.03 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 5



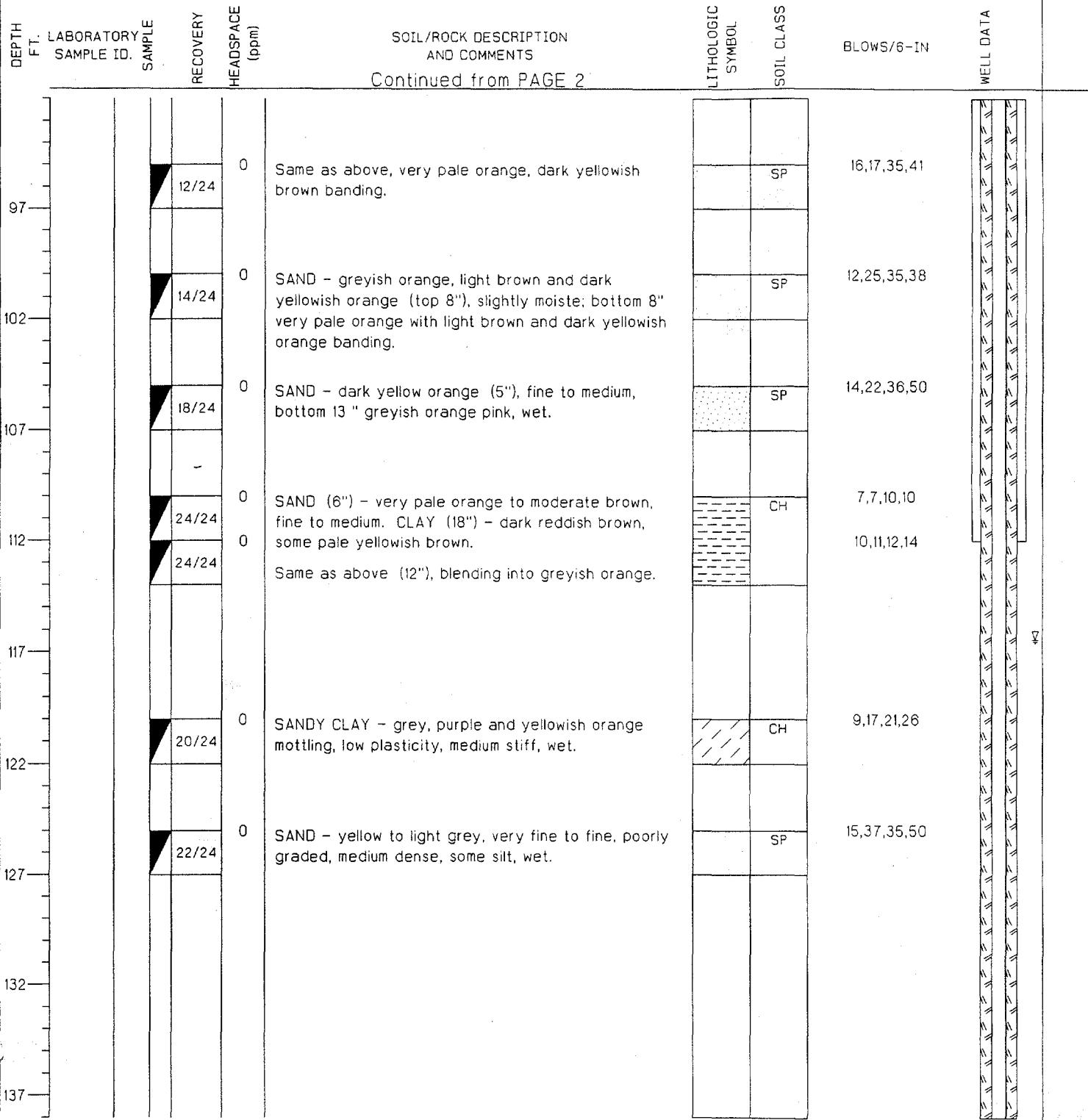
TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-6-1D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 5/7/93	COMPLTD: 5/19/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT. PROTECTION LEVEL: Modified D
TOC ELEV.: 177.79 FT.	MONITOR INST.: FID	TOT DPTH: 180FT. DPTH TO V 116.44 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:	SITE: 6

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-6-SB-3 FOR LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								
45								

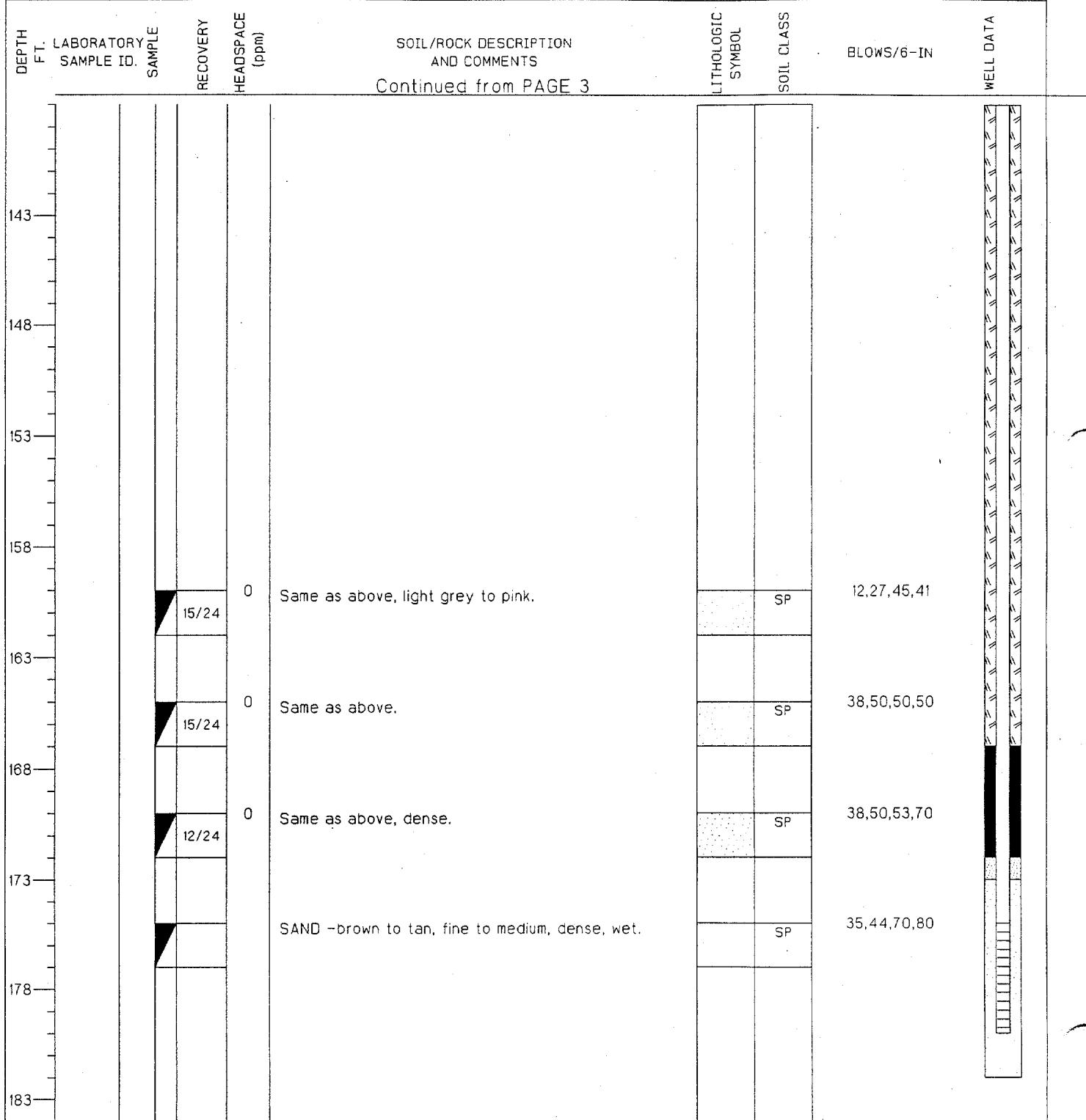
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-1D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/7/93	COMPLTD: 5/19/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT.	PROTECTION LEVEL: Modified D
TOC ELEV.: 177.79 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DPTH TO ∇ 116.44 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:		SITE: 6

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				Continued from PAGE 1					
51									
56									
61									
66									
71									
76									
81									
86									
91		18/24	0	SAND – greyish pink, fine, moderate red orange banding, poorly graded.			SP	23,32,38,50	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-ID	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/7/93	COMPLTD: 5/19/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT.	PROTECTION LEVEL: Modified D
TOC ELEV.: 177.79 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DEPTH TO 116.44 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:		SITE: 6



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-ID	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/7/93	COMPLTD: 5/19/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 175-180 FT.	PROTECTION LEVEL: Modified D
TOC ELEV.: 177.79 FT.	MONITOR INST.: FID	TOT DPTH: 180FT.	DPHT TO 116.44 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE:		SITE: 6



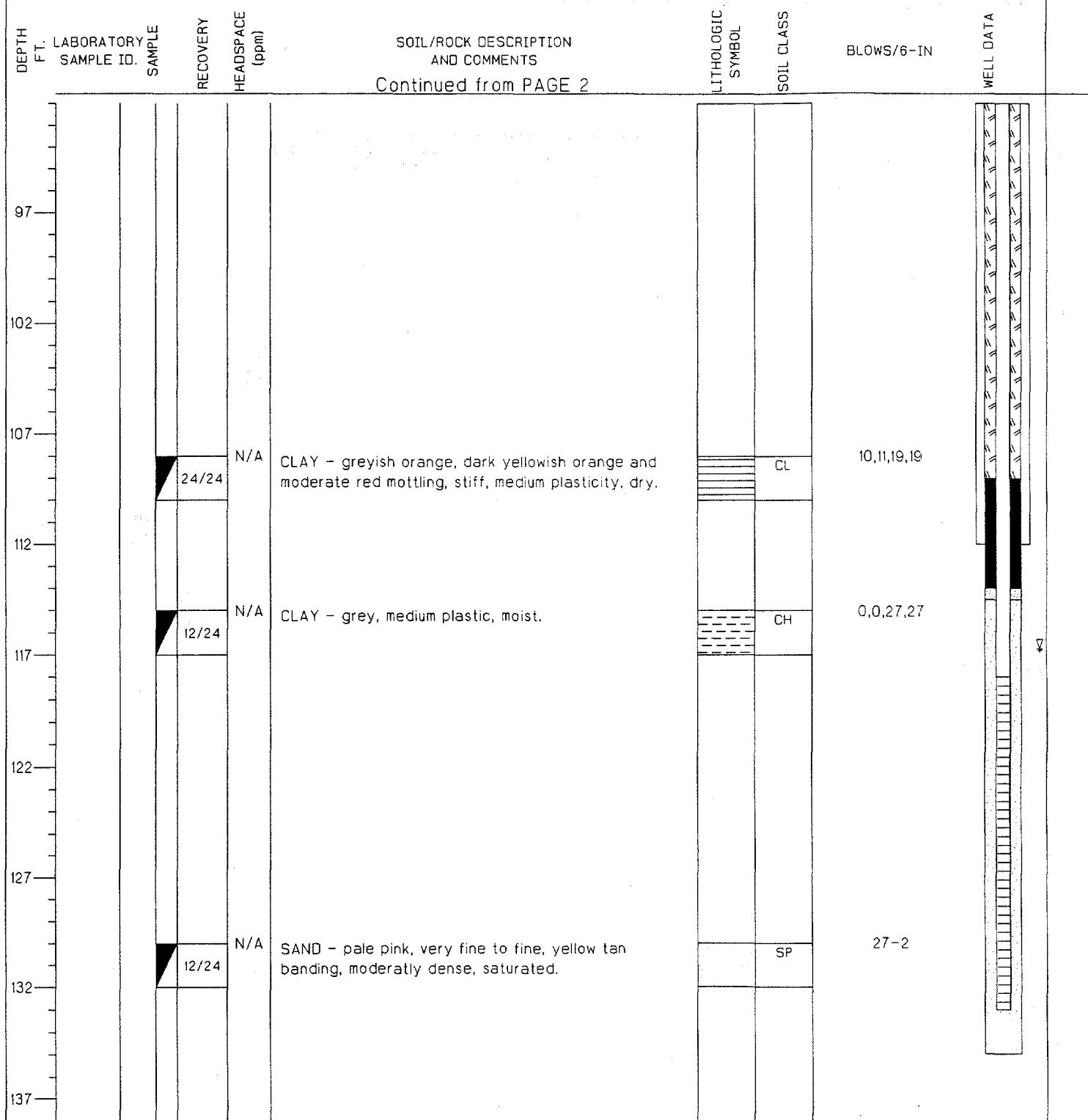
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-1S		BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/11/93		COMPLTD: 5/20/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 118-132	PROTECTION LEVEL: D	
TOC ELEV.: 177.81 FT.	MONITOR INST.: FID	TOT DPTH: 133FT.	DPTH TO 116.71 FT.	
LOGGED BY: S. Consalvi/KGK	WELL DEVELOPMENT DATE:			SITE: 6

DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-6-3 FOR LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								
45								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-IS	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/11/93	COMPLTD: 5/20/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 118-132	PROTECTION LEVEL: D
TOC ELEV.: 177.81 FT.	MONITOR INST.: FID	TOT DPTH: 133FT.	DPHTH TO 116.71 FT.
LOGGED BY: S. Consalvi/KGK	WELL DEVELOPMENT DATE:		SITE: 6

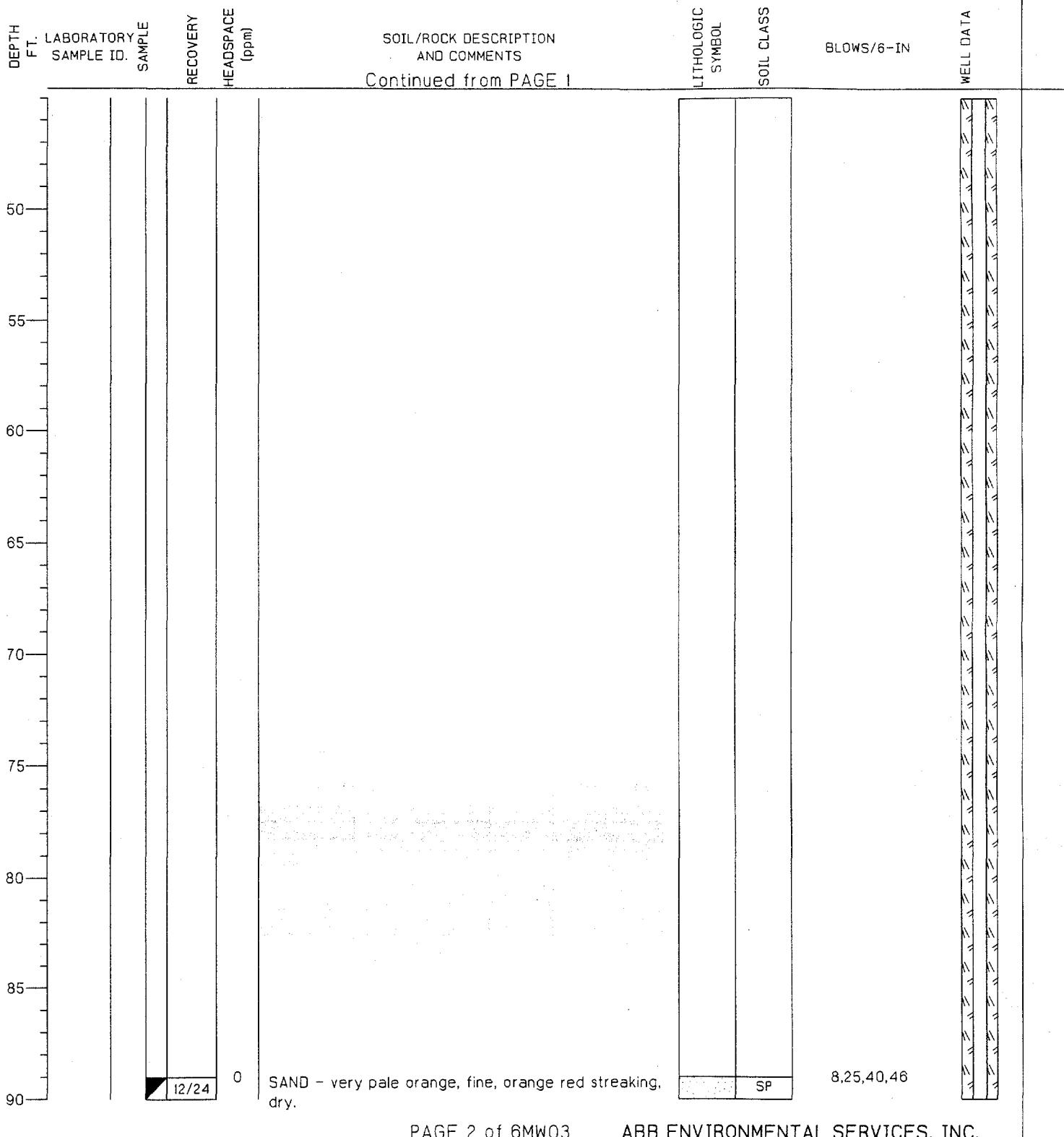
DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
			Continued from PAGE 1					
51								
56								
61								
66								
71								
76								
81								
86								
91								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/11/93	COMPLTD: 5/20/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 118-132	PROTECTION LEVEL: D
TOC ELEV.: 177.81 FT.	MONITOR INST.: FID	TOT DPTH: 133FT.	DEPTH TO 116.71 FT.
LOGGED BY: S. Consalvi/KGK	WELL DEVELOPMENT DATE:		SITE: 6

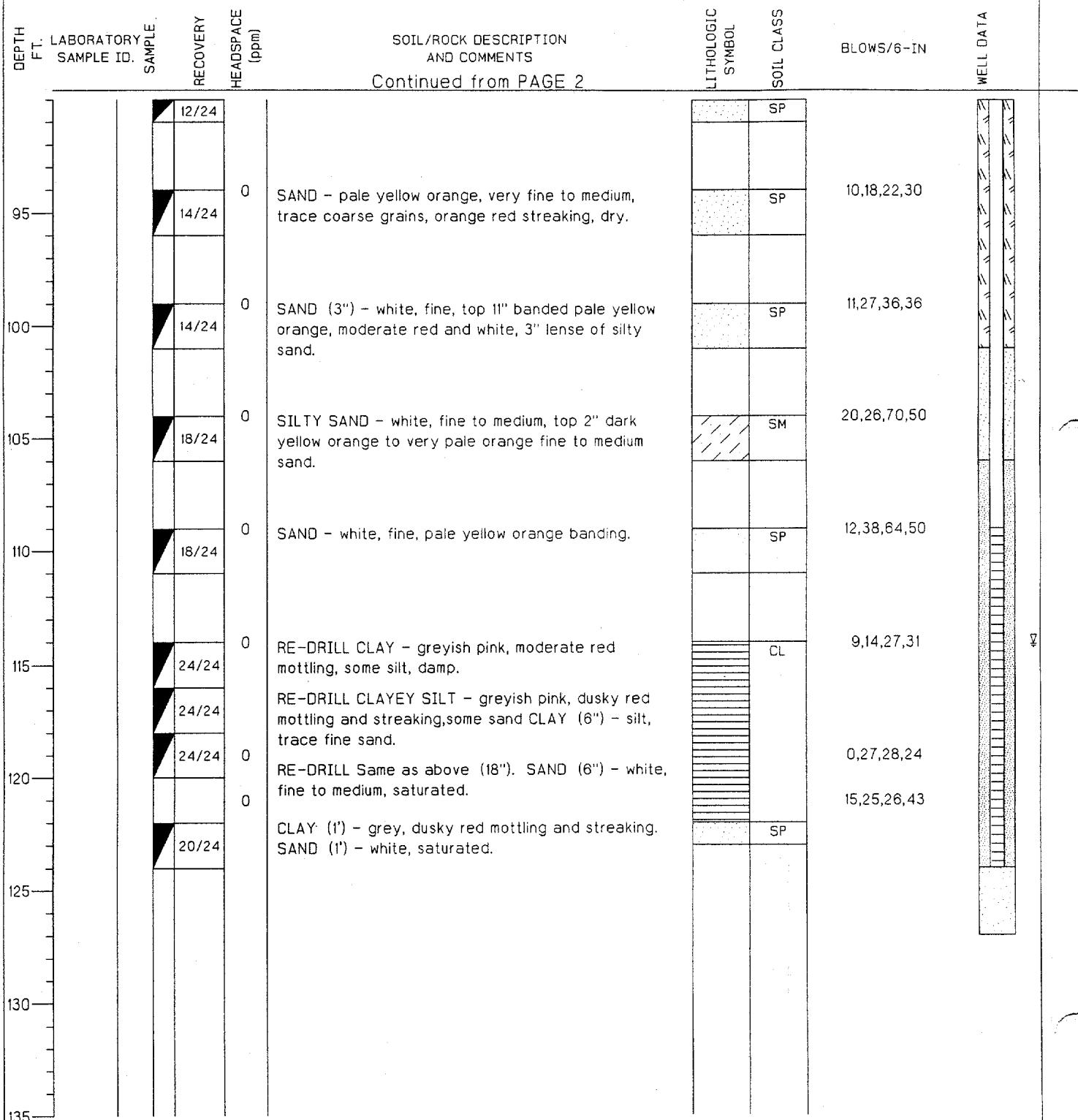


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-6-3		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/4/93		COMPLTD: 5/7/93				
METHOD: HOLLOW STEM AUGER		CASE SIZE: 2"		SCREEN INT.: 109-124 FT		PROTECTION LEVEL: Modified D			
TOC ELEV.: 176.14 FT.		MONITOR INST.: OVA		TOT DPTH: 124FT.		DPTH TO Δ 114.11 FT.			
LOGGED BY: S. Consalvi		WELL DEVELOPMENT DATE: 6/8/93			SITE: 6				
DEPTH F.T.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN WELL DATA		
5									
10			0	SANDY SILT - moderate red brown, very fine, poorly graded.	/\ / \ / \ /	SM	4,10,8,11		
15									
20			0	Same as above, over 6" of dark yellow orange.	/\ / \ / \ /	SM	7,8,8,11		
25									
30			0	SAND - white, fine, very poorly graded, grey and yellow banding, dry.	/\ / \ / \ /	SP	12,20,27,36		
35									
40									
45									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/7/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 109-124 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.14 FT.	MONITOR INST.: OVA	TOT DPTH: 124FT.	DPHT TO 114.11 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE: 6/8/93		SITE: 6

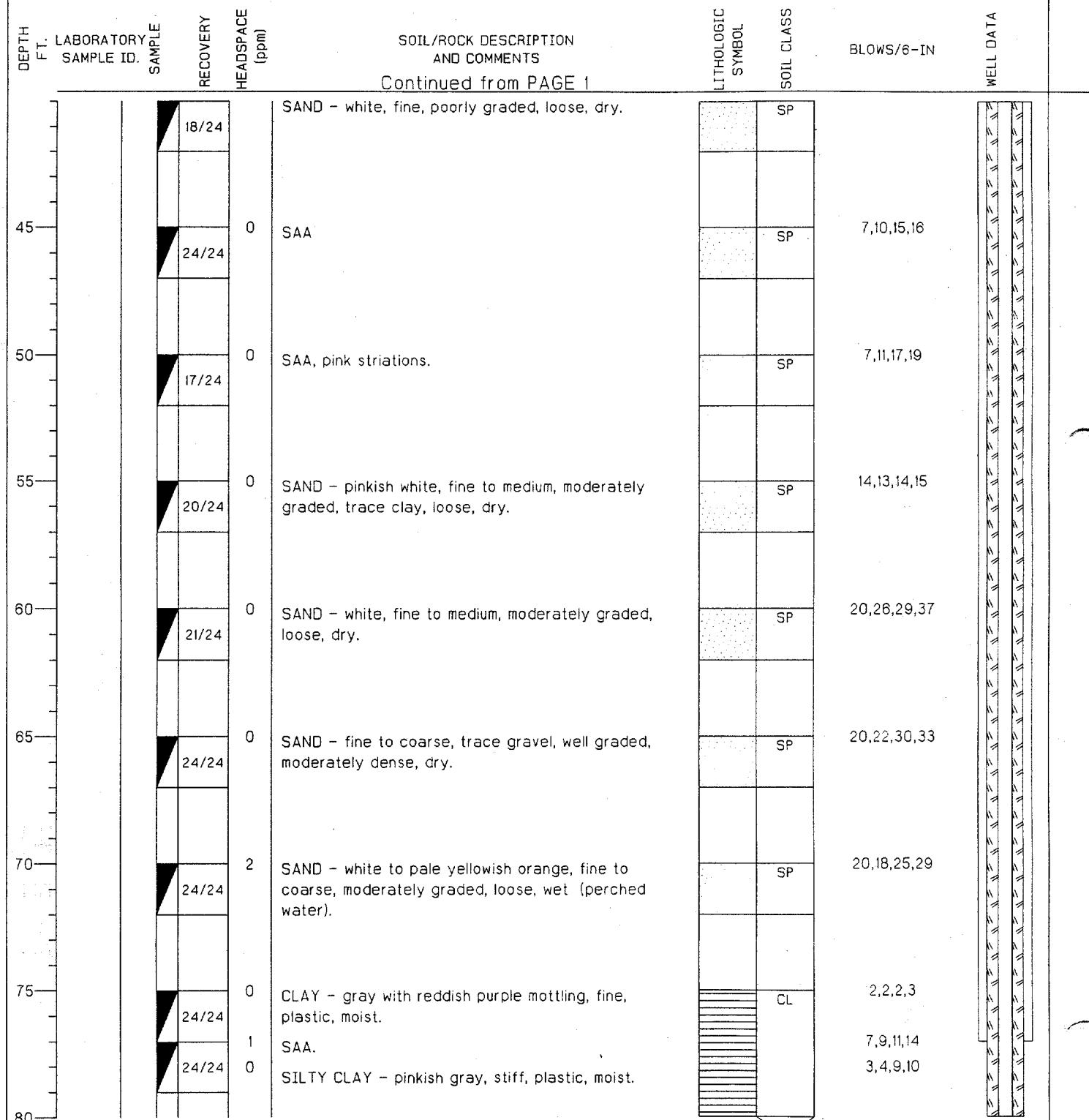


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-6-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/4/93	COMPLTD: 5/7/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 109-124 FT	PROTECTION LEVEL: Modified D
TOC ELEV.: 176.14 FT.	MONITOR INST.: OVA	TOT DPTH: 124FT.	DPTH TO ∇ 114.11 FT.
LOGGED BY: S. Consalvi	WELL DEVELOPMENT DATE: 6/8/93		SITE: 6

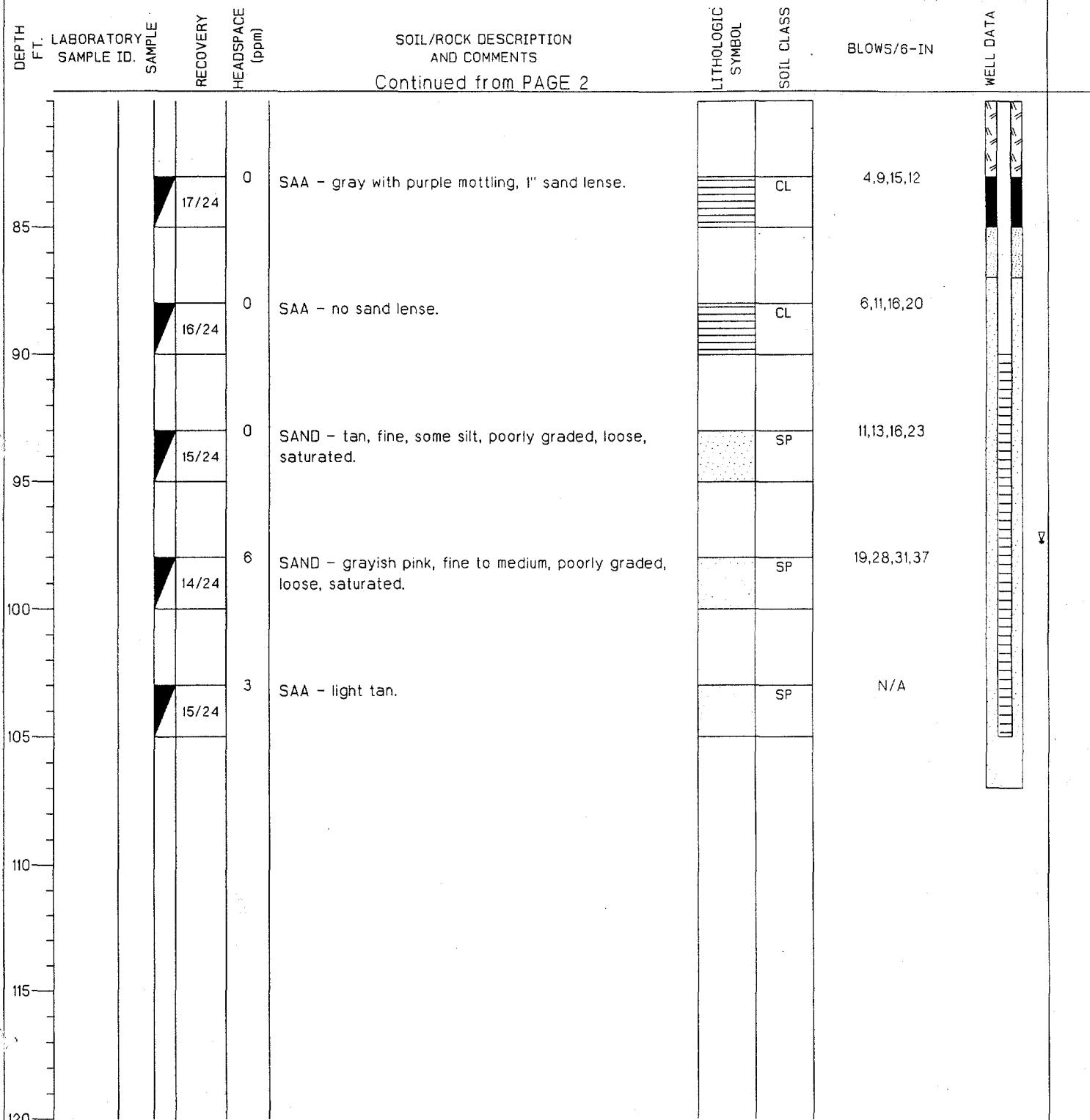


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-9-3	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 2/22/93	COMPLTD: 2/25/93			
METHOD: MUD ROTARY	CASE SIZE: 2"		SCREEN INT.: 90-105	PROTECTION LEVEL: Modified D				
TOC ELEV.: 150.98 FT.	MONITOR INST.: OVA		TOT DPTH: 107FT.	DPTH TO 7 97.37 FT.				
LOGGED BY: M. Alvarezi	WELL DEVELOPMENT DATE:			SITE: 9				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			3	SAND - moderate reddish orange, fine, silty sand, dark red orange, dry.	/	SM	2,8,16,21	====
10			0	SILTY SAND - reddish brown, fine, poorly graded, 1" clay lense, dry.	/	SM	4,9,5,10	====
15			0	SAND - yellow to dark reddish brown, very fine to fine, some silt, striations, poorly graded, dry.	/	SP	4,4,4,8	====
20			0	SAA	/	SP	5,4,5,5	====
25			0	SAA, color change to dark purple to pink.	/	SP	5,4,7,8	====
30			0	SAA, pink, dark purple, to pale yellow.	/	SP	5,5,7,8	====
35			0	SAND - white pink to yellow, fine to medium, moderately graded, loose, dry.	/	SP	3,6,8,11	====
40			0				6,7,16,14	====

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-9-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/22/93	COMPLTD: 2/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 90-105	PROTECTION LEVEL: Modified D
TOC ELEV.: 150.98 FT.	MONITOR INST.: OVA	TOT DPTH: 107FT.	DEPTH TO 97.37 FT.
LOGGED BY: M. Alvarezi	WELL DEVELOPMENT DATE:		SITE: 9

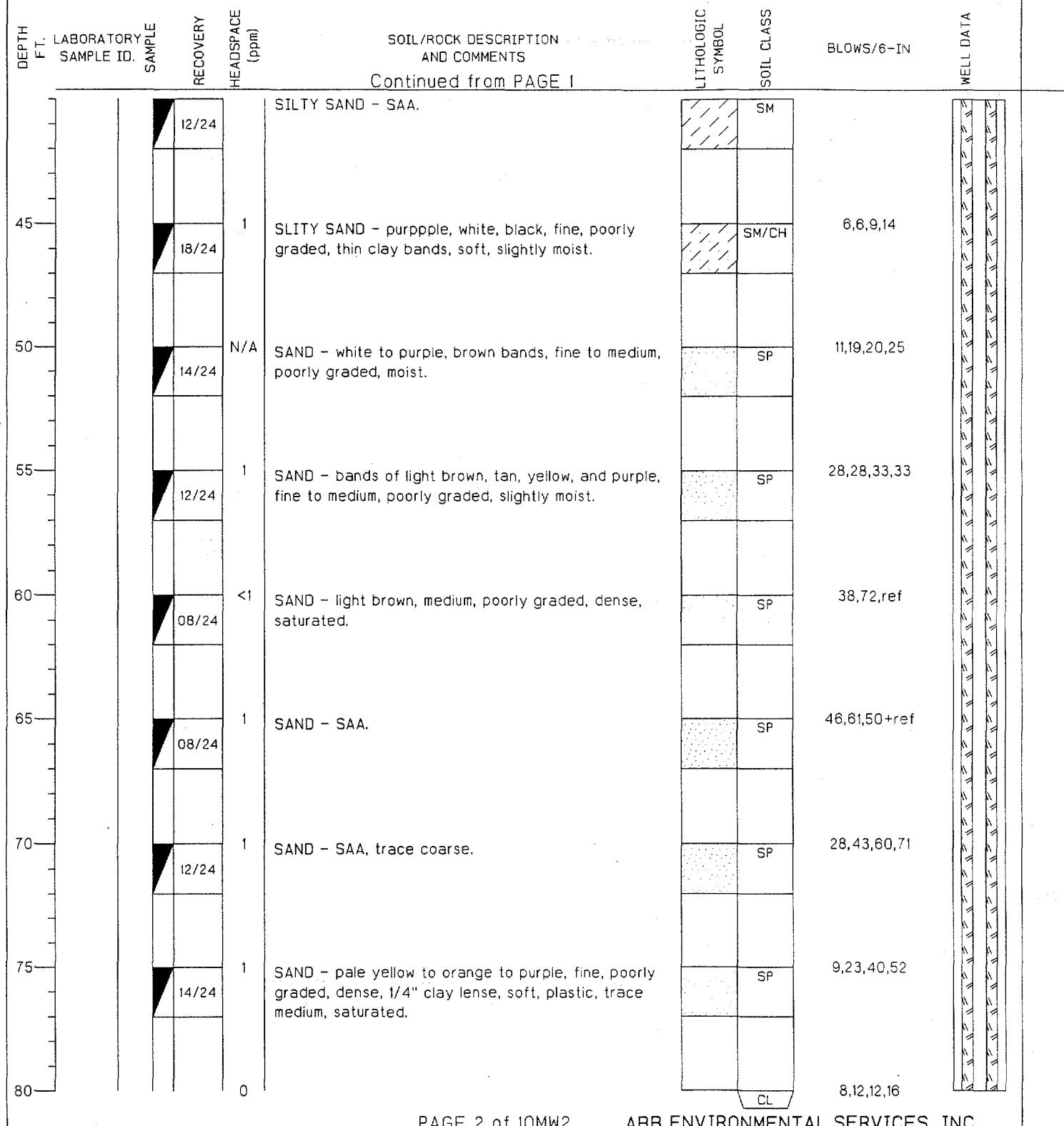


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-9-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/22/93	COMPLTD: 2/25/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 90-105	PROTECTION LEVEL: Modified D
TOC ELEV.: 150.98 FT.	MONITOR INST.: OVA	TOT DPTH: 107FT.	DEPTH TO 97.37 FT.
LOGGED BY: M. Alvarezi	WELL DEVELOPMENT DATE:		SITE: 9

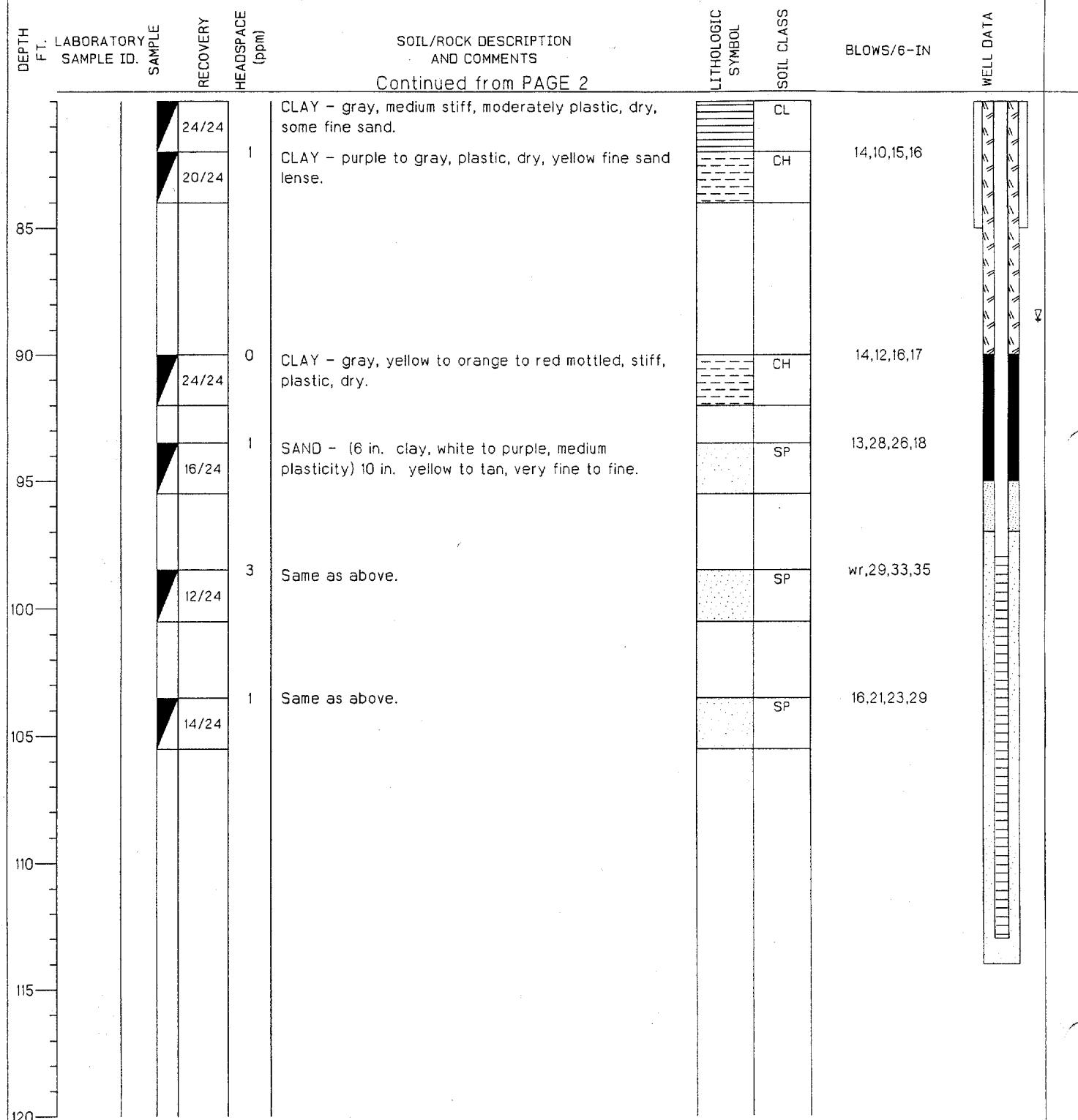


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-10-2	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 3/08/93	COMPLTD: 3/23/93			
METHOD: MUD ROTARY		CASE SIZE: 2"	SCREEN INT.: 98-113 FT.		PROTECTION LEVEL: D			
TOC ELEV.: 150.83 FT.		MONITOR INST.: OVA	TOT DPTH: 115FT.		DPTH TO 88.6 FT.			
LOGGED BY: R. Nelson		WELL DEVELOPMENT DATE:			SITE: 10			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		0	SANDY CLAY - reddish brown, poorly graded, dry.		— —	SC	3,2,3,3	
10		0	SAND - orange to red, fine to medium, poorly graded, dry.		— —	SP	3,5,6,9	
15		0	SANDY CLAY - reddish brown, fine to medium, poorly graded, dry.		— —	SC	14,19,19,29	
20		2	SILTY SAND - reddish brown, 1/2" clay lens, gray soft, plastic. SAND - yellow, medium, poorly graded, dry.		/ / /	SM/CH/SP	8,12,14,22	
25		0	CLAYEY SAND - 5" bands mixed with 3" clay bands, soft, plastic, moist		— —	SC/CH	3,3,4,5	
30		0	SILTY SAND - yellow to tan, fine, poorly graded, moist.		/ / /	SM	7,5,6,5	
35		0	SILTY SAND - SAA, slightly moist, purple bands.		/ / /	SM	7,7,9,10	
40		1				SM	8,7,10,10	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-10-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/08/93	COMPLTD: 3/23/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 98-113 FT.	PROTECTION LEVEL: D
TOC ELEV.: 150.83 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPTH TO V 88.6 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:	SITE: 10	

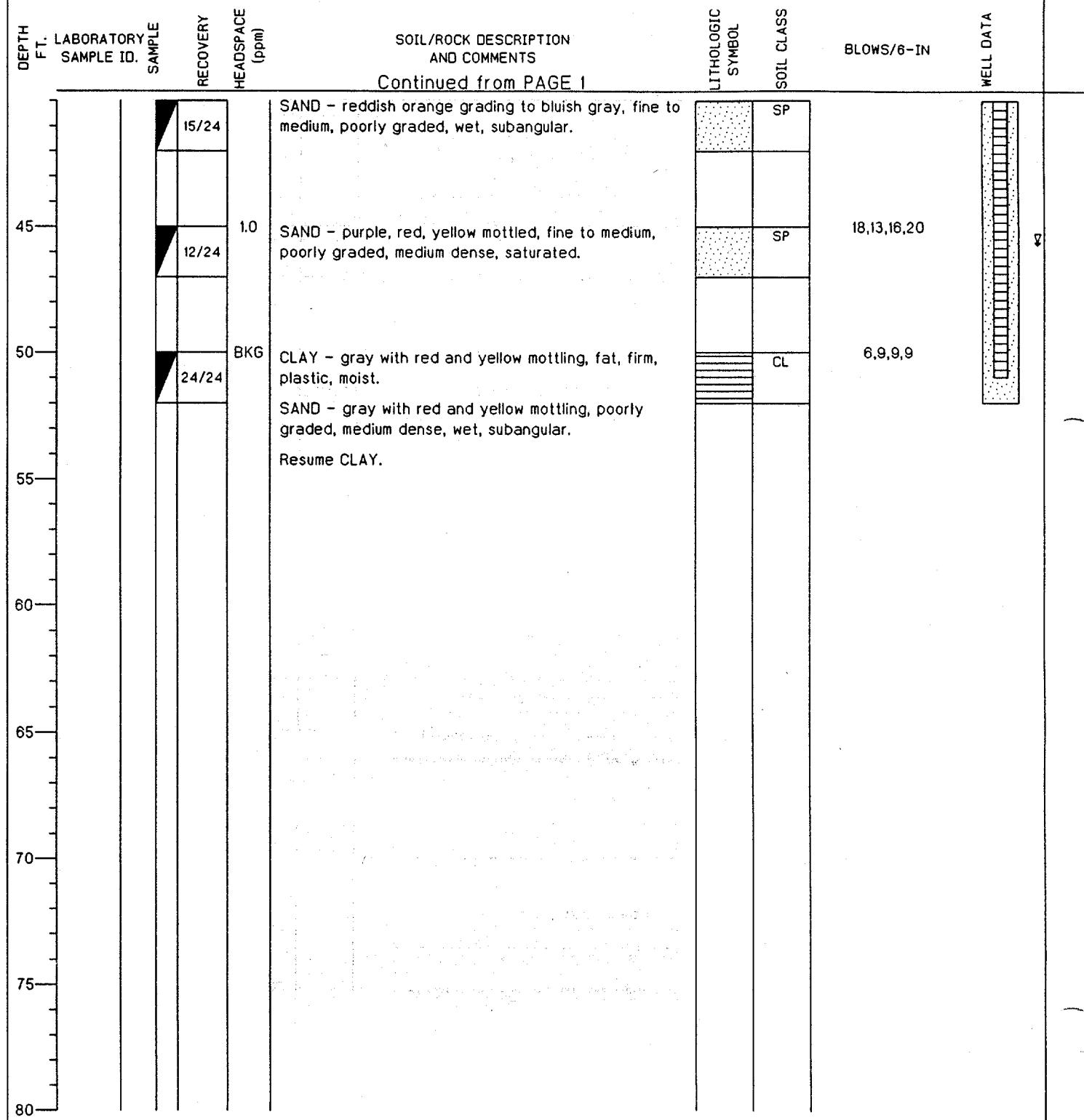


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-10-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/08/93	COMPLTD: 3/23/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 98-113 FT.	PROTECTION LEVEL: D
TOC ELEV.: 150.83 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DEPTH TO 88.6 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 10



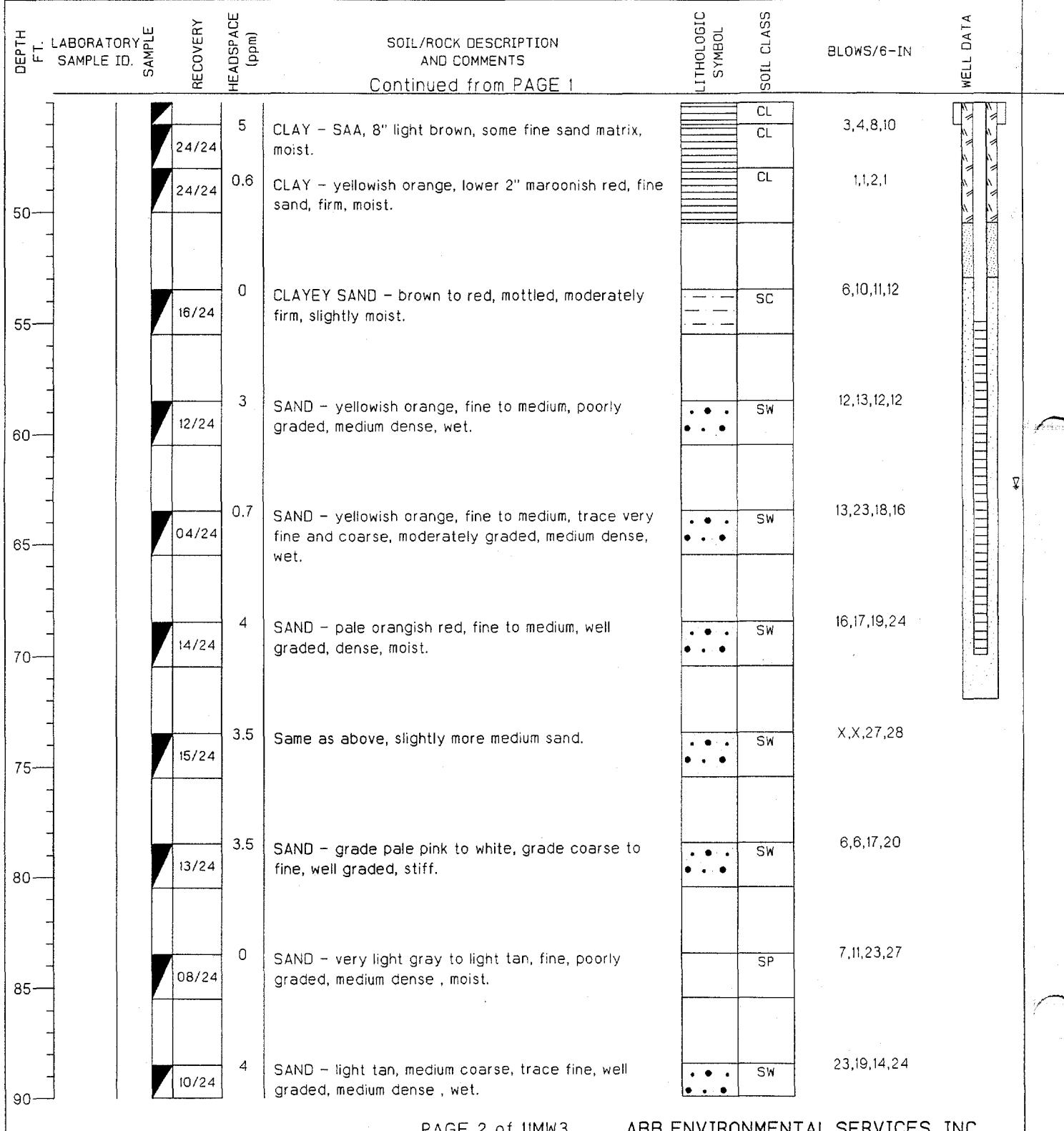
TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-11-1S		BORING NO.				
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/21/93		COMPLTD: 7/21/93						
METHOD: MUD ROTARY		CASE SIZE: 2"	SCREEN INT.: 36-51 FT		PROTECTION LEVEL: D					
TOC ELEV.: 117.15 FT.		MONITOR INST.: OVA	TOT DPTH: 52FT.		DPTH TO V 45.64 FT.					
LOGGED BY: N. Roka		WELL DEVELOPMENT DATE:		SITE: 11						
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5					BKG	SAND - red, little fine to medium, poorly graded, medium dense, wet, subangular. SAND - red, fine, little silt, medium dense, moist.		SP	4,5,6,7	
10					BKG	Same as above, except mostly silt, medium dense, damp.		SM/ML	8,8,9,11	
15					BKG	Same as above.		SM/ML	6,5,9,11	
20					2.0	Same as above. SILT - red, very soft, saturated.		SM/ML	7,8,9,9	
25					3.0	SAND - red grade to light orange, fine to medium, trace silt, poorly graded, medium dense, subangular.		SP	11,12,13,11	
30					8.5	CLAY - reddish yellow, gray mottled, firm to stiff, damp. SANDY SILT - brown, medium firm, soft. SAND - mustard yellow, fine, poorly graded, dense, damp.		SP	15,17,22,28	
35					60	Same as above, light tannish orange, very dense, moist.		SP	33,51,REF	
40					81			SP	32,29,41,47	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-11-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/21/93	COMPLTD: 7/21/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 36-51 FT	PROTECTION LEVEL: D
TOC ELEV.: 117.15 FT.	MONITOR INST.: OVA	TOT DPTH: 52FT.	DPTH TO ↓ 45.64 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: II

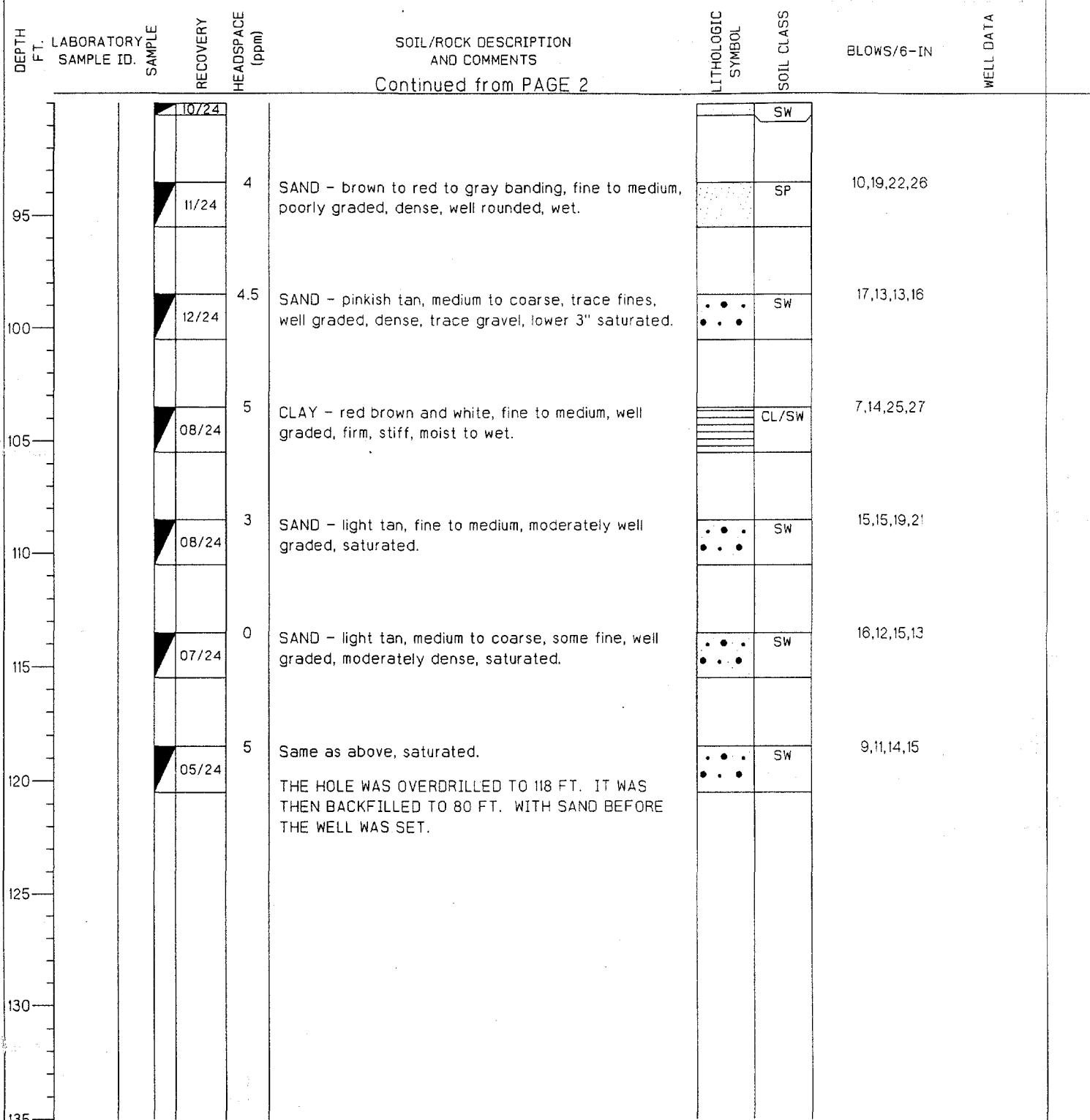


TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-II-3		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA		
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 2/22/93		COMPLTD: 3/9/93			
METHOD: MUD ROTARY	CASE SIZE: 2"		SCREEN INT.: 55-70 FT	PROTECTION LEVEL: D				
TOC ELEV.: 117.24 FT.	MONITOR INST.: OVA		TOT DPTH: 118FT.	DPTH TO 62.45 FT.				
LOGGED BY: L. Foster	WELL DEVELOPMENT DATE:			SITE: 11				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		20/24	0	SAND - reddish brown, fine, poorly graded, loose, moist.		SP	POSTHOLE	
10		24/24	0	SAND - dark reddish brown, fine, silt, poorly graded, stiff, slightly moist.	/	SM	3,3,3,4	
15		20/24	0	SAND - SAA.	/	SM	6,8,10,11	
20		24/24	0	SAND - SAA.	/	SM	6,9,11,11	
25		24/24	0	SAND - orangish brown, fine, poorly graded.		SP	4,5,6,6	
30		23/24	0	SAND - fine, moist, loose.		SP	4,5,6,6	
35		24/24	0	SAND - off-white, fine, poorly graded, loose, dry.		SP	4,11,18,28	
40		24/24	0	SAND - SAA.	• • •	SW	5,10,13,17	
45		24/24	7	CLAY - gray to red, stiff, moist.		CL	2,3,5,7	
		24/24	6	CLAY - SAA.		CL	5,7,8,9	
		24/24	4	CLAY - red to tan, inorganic, trace silt, plastic, moist.		CL	2,3,4,6	

TITLE: Naval Air Station Whiting Field		LOG OF WELL: WHF-11-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/22/93	COMPLTD: 3/9/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 55-70 FT	PROTECTION LEVEL: 0
TOC ELEV.: 117.24 FT.	MONITOR INST.: OVA	TOT DPTH: 118FT.	DPHT TO 62.45 FT.
LOGGED BY: L. Foster	WELL DEVELOPMENT DATE:		SITE: 11

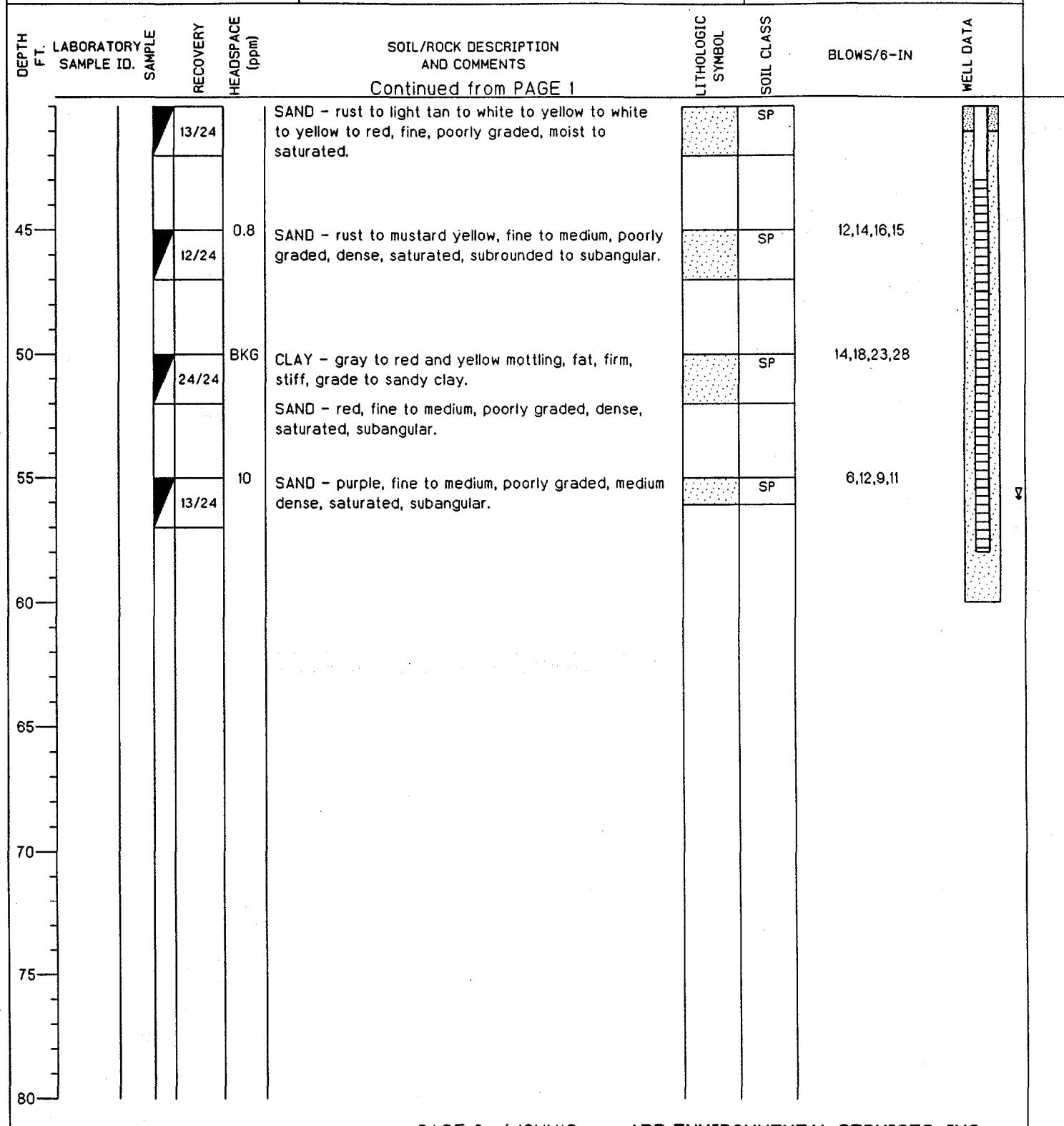


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-11-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/22/93	COMPLTD: 3/9/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 55-70 FT	PROTECTION LEVEL: D
TOC ELEV.: 117.24 FT.	MONITOR INST.: OVA	TOT DPTH: 118FT.	DEPTH TO 62.45 FT.
LOGGED BY: L. Foster	WELL DEVELOPMENT DATE:	SITE: 11	

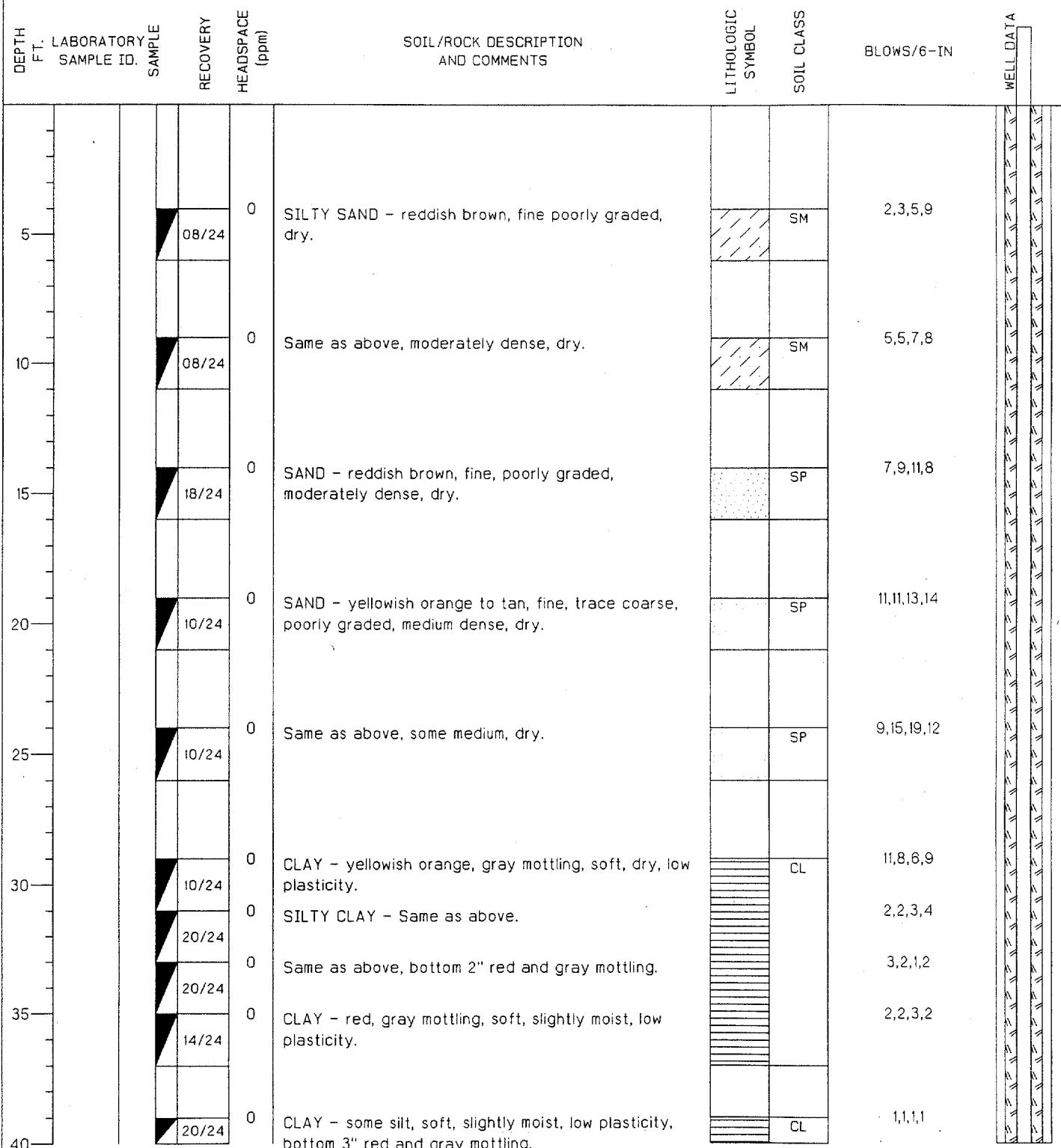


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-13-1S			BORING NO.			
CLIENT: SOUTHNAVFACENGCOM							PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 7/19/93		COMPLTD: 7/20/93				
METHOD: MUD ROTARY		CASE SIZE: 2"		SCREEN INT.: 43-58 FT		PROTECTION LEVEL: D				
TOC ELEV.: 109.47 FT.		MONITOR INST.: OVA		TOT DPTH: 60FT.		DPTH TO ↓ 55.8 FT.				
LOGGED BY: N. Roka		WELL DEVELOPMENT DATE:			SITE: 13					
DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS			LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5	24/24	0.2	SILT - red, very fine, medium dense, very soft, wet.			ML		8,9,12,14		
10	20/24	0.9	CLAYEY SILT - red, slightly moist, firm, some sand.			ML		8,9,10,13		
15	24/24	1.4	Same as above, yellow and red mottled, no clay.			ML		7,9,11,14		
20	19/24	0.2	Same as above, some clay.			ML		5,5,7,9		
25	12/24	0.6	Same as of above. SAND - light tan to orange, fine to medium, poorly graded, dense, moist, subrounded.			ML/SP		12,16,18,19		
30	14/24	1.8	SAND - white to tan to orange, very fine, silt, medium dense, dry.			SP		11,12,15,17		
35	12/24	4.5	Same as above, light tan to yellow.			SP		11,14,17,22		
40		1.4				SP		12,14,18,24		

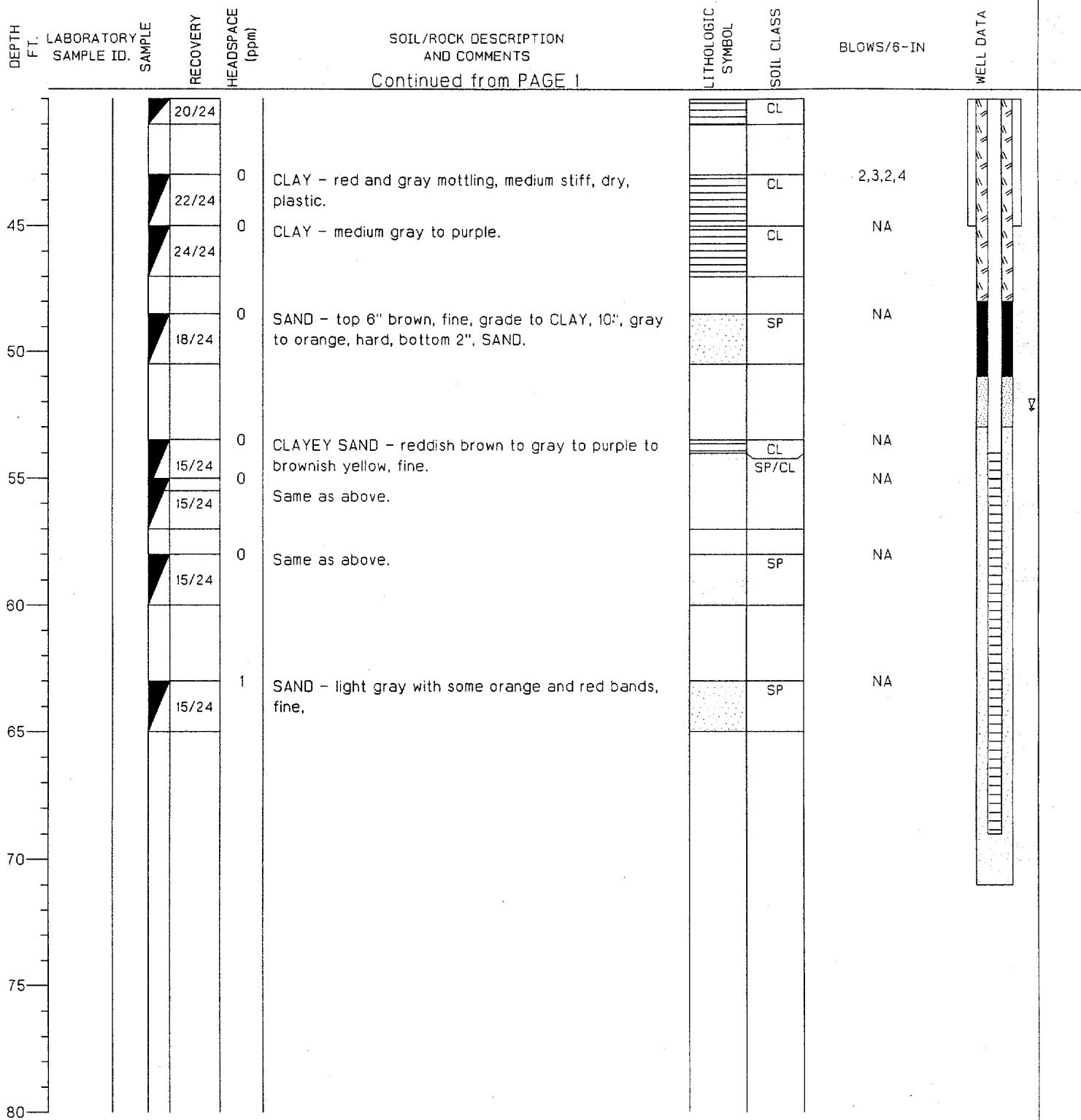
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-13-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/19/93	COMPLTD: 7/20/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 43-58 FT	PROTECTION LEVEL: D
TOC ELEV.: 109.47 FT.	MONITOR INST.: OVA	TOT DPTH: 60FT.	DEPTH TO ↓ 55.8 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 13



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-13-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/10/93	COMPLTD: 3/18/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 54-69	PROTECTION LEVEL: D
TOC ELEV.: 102.92 FT.	MONITOR INST.: OVA	TOT DPTH: 71FT.	DEPTH TO 52.26 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 13

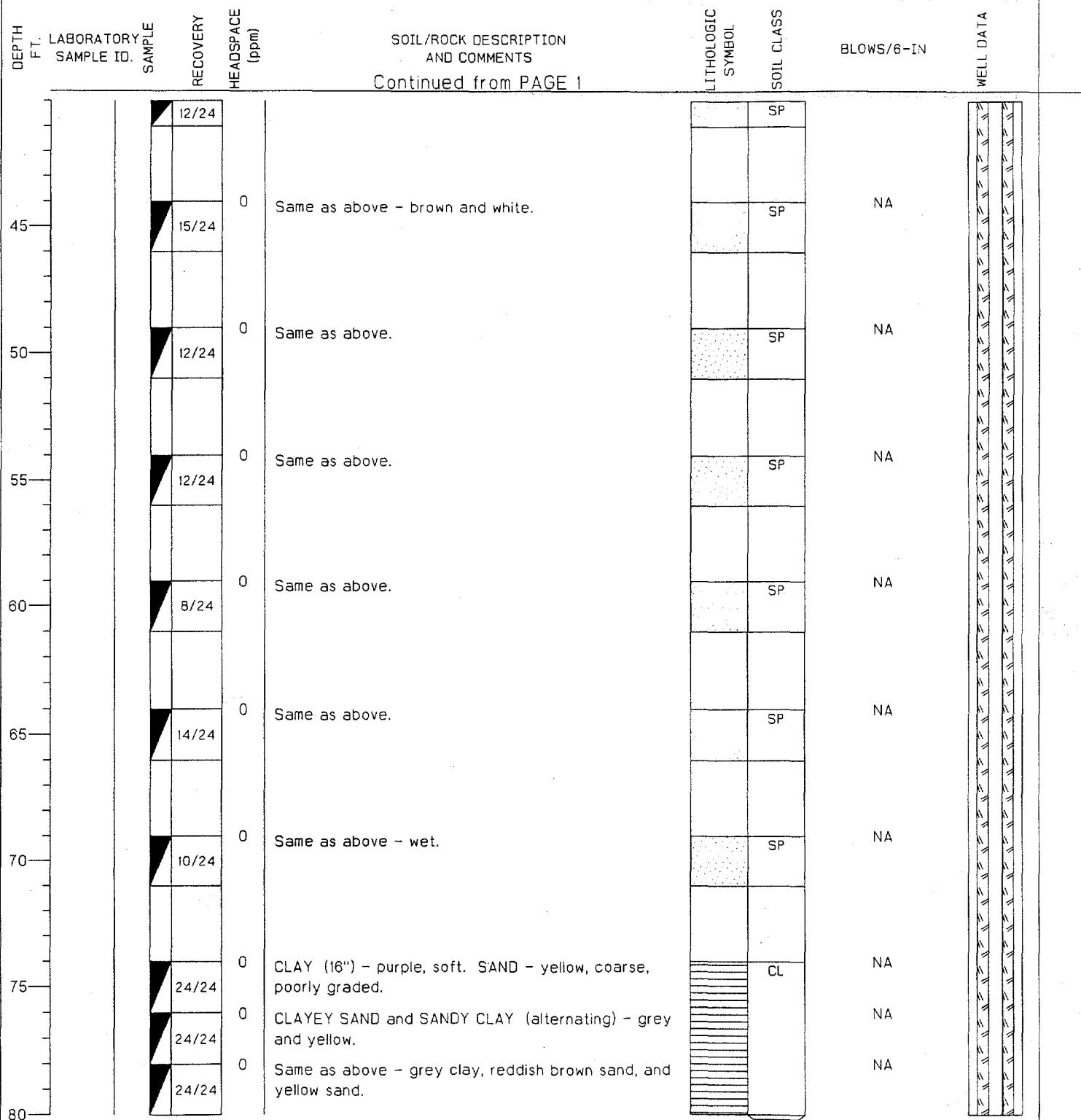


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-13-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/10/93	COMPLTD: 3/18/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 54-69	PROTECTION LEVEL: D
TOC ELEV.: 102.92 FT.	MONITOR INST.: OVA	TOT DPTH: 71FT.	DPHT TO 52.26 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 13

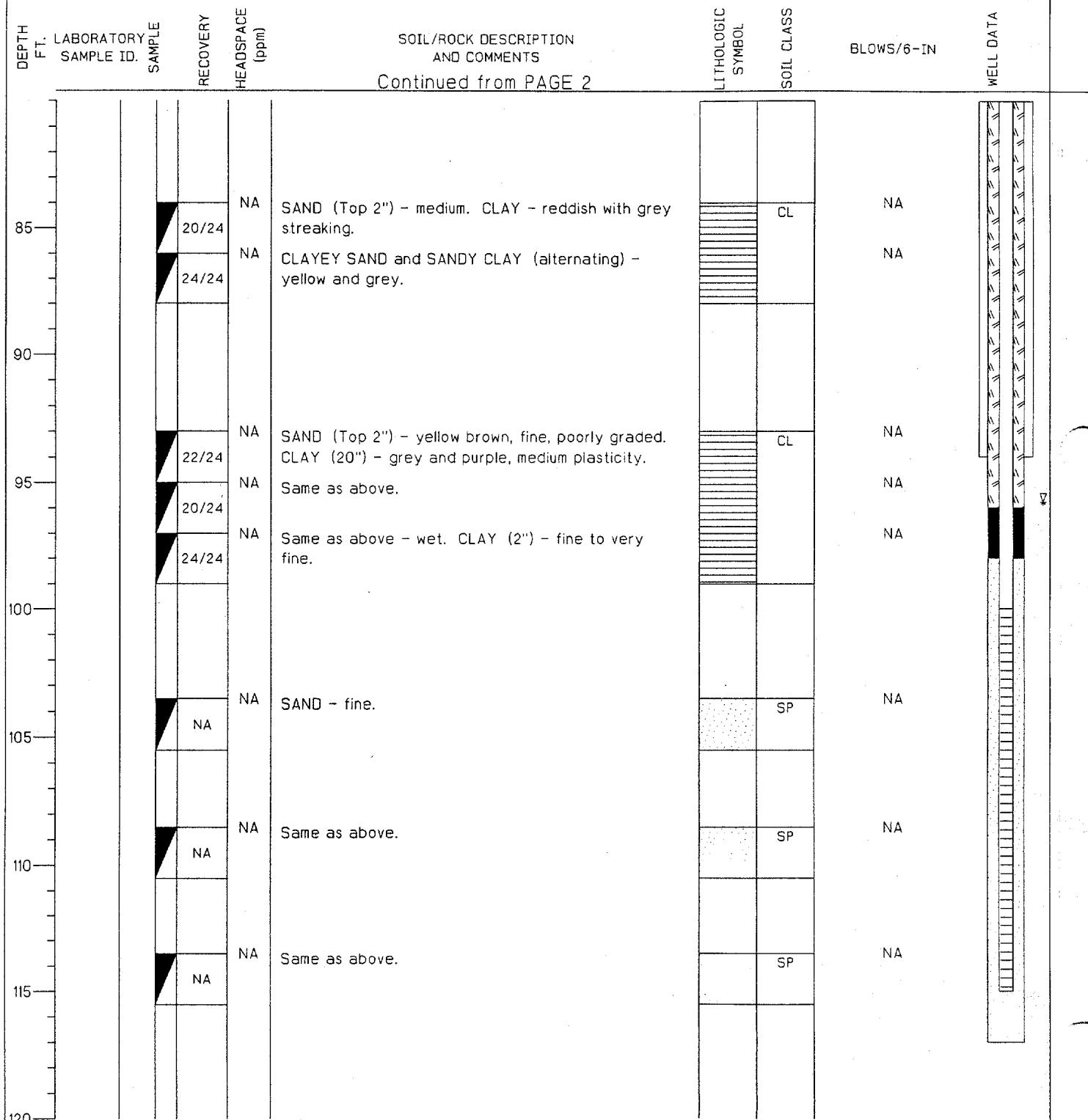


TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-14-2		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 3/18/93		COMPLTD: 3/22/93			
METHOD: MUD ROTARY	CASE SIZE: 2"		SCREEN INT.: 100-115	PROTECTION LEVEL: D				
TOC ELEV.: 145.86 FT.	MONITOR INST.: OVA		TOT DPTH: 115FT.	DPTH TO 95.8 FT.				
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:			SITE: 14				
DEPTH F.T. SAMPLE	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0	SILTY SAND - reddish brown, fine.		SP		NA
10		18/24	0	Same as above.		SP		3,3,5,6
15		12/24	0	CLAYEY SAND - yellow and red brown mixture.		SP		5,5,12,6
20		19/24	0	CLAY - red brown, with silt and sand.		SP		NA
25		12/24	0	SAND - red brown, fine to very fine, well sorted.		SP		NA
30		17/24	0	SAND - purple and grey, fine, little silt.		SP		NA
35		18/24	0	Same as above - thin beds of alternating colors.		SP		NA
40		10/24	0	Same as above (Top 6") SAND (12") - purple and yellow, fine, wet.		SP		NA
		18/24	0	SAND - white, yellow and brown, very fine, poorly graded.		SP		NA

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-14-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/18/93	COMPLTD: 3/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 100-115	PROTECTION LEVEL: D
TOC ELEV.: 145.86 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPHT TO 95.8 FT.
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:		SITE: 14

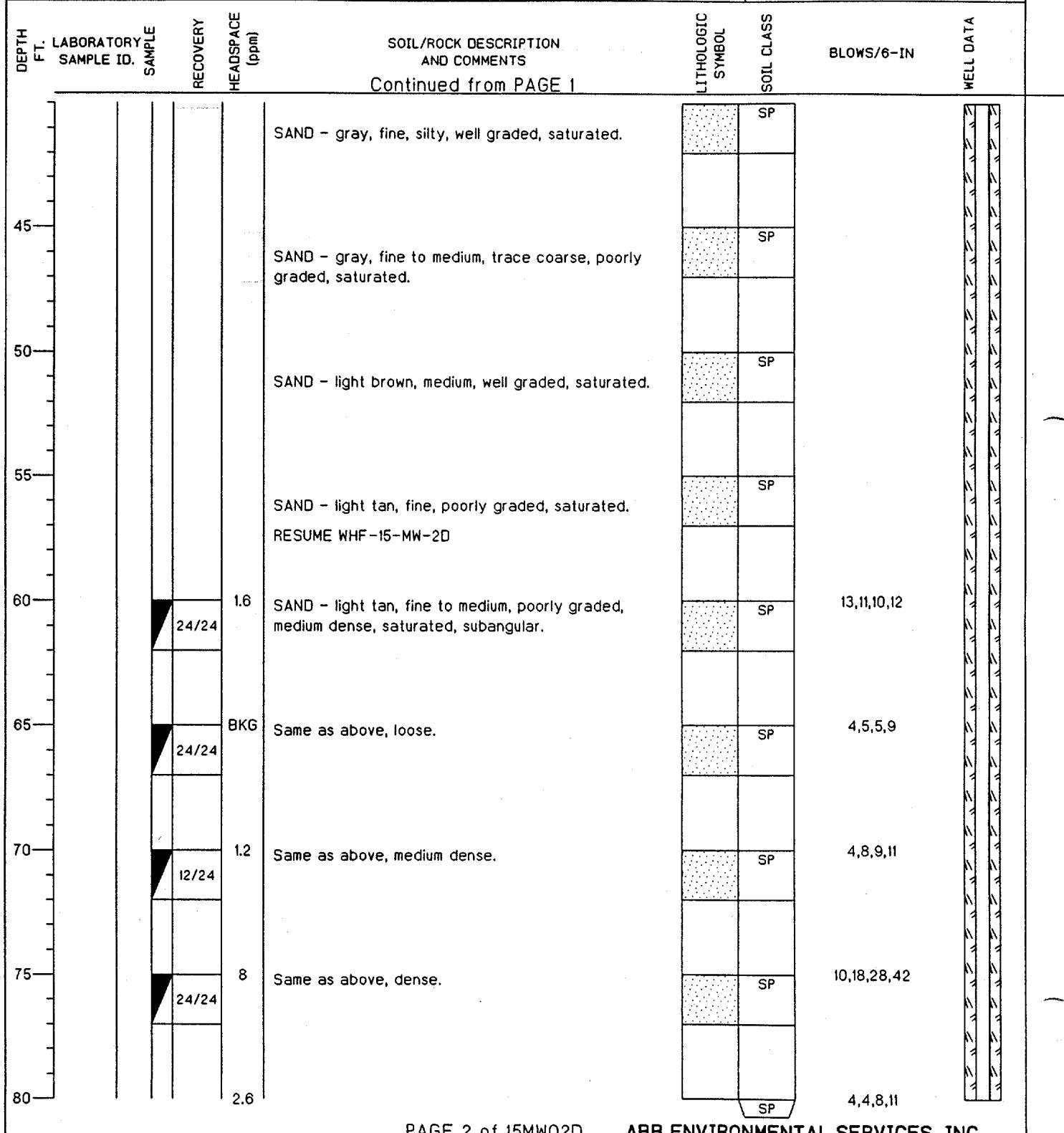


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-14-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 3/18/93	COMPLTD: 3/22/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 100-115	PROTECTION LEVEL: D
TOC ELEV.: 145.86 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DEPTH TO 95.8 FT.
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:		SITE: 14



TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-15-2D	BORING NO.				
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 07/17/93	COMPLTD: 07/18/93					
METHOD: MUD ROTARY	CASE SIZE: 2 in.		SCREEN INT.: 104.6-109.6 FT	PROTECTION LEVEL: D					
TOC ELEV.: 60.07 FT.	MONITOR INST.: OVA		TOT DPTH: 110FT.	DPTH TO 19.33 FT.					
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill						
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5									
10									
15									
20									
25									
30									
35									
40									

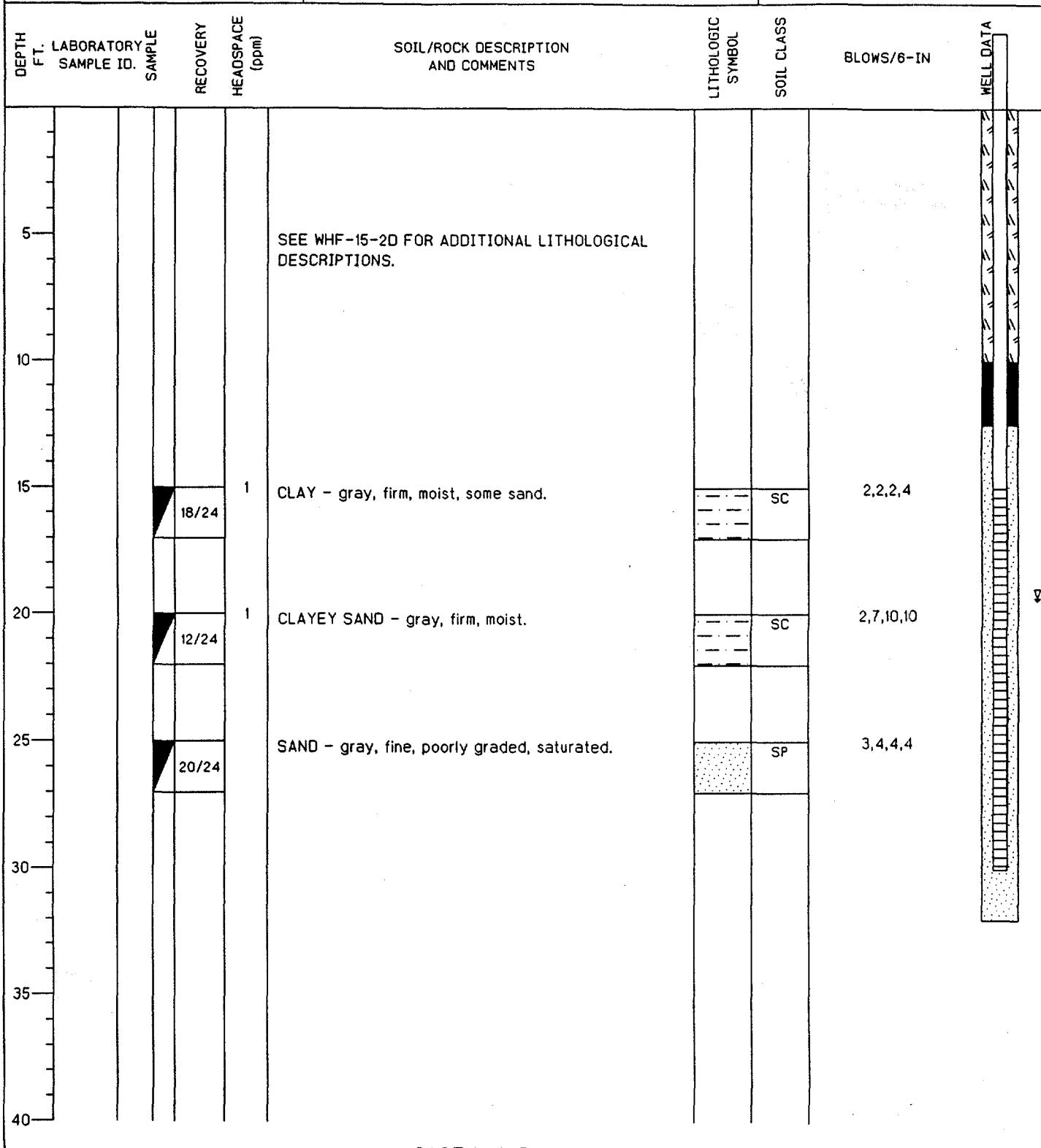
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-2D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 07/17/93	COMPLTD: 07/18/93
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 104.6-109.6	PROTECTION LEVEL: D
TOC ELEV.: 60.07 FT.	MONITOR INST.: OVA	TOT DPTH: 110FT.	DPHT TO ↓ 19.33 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



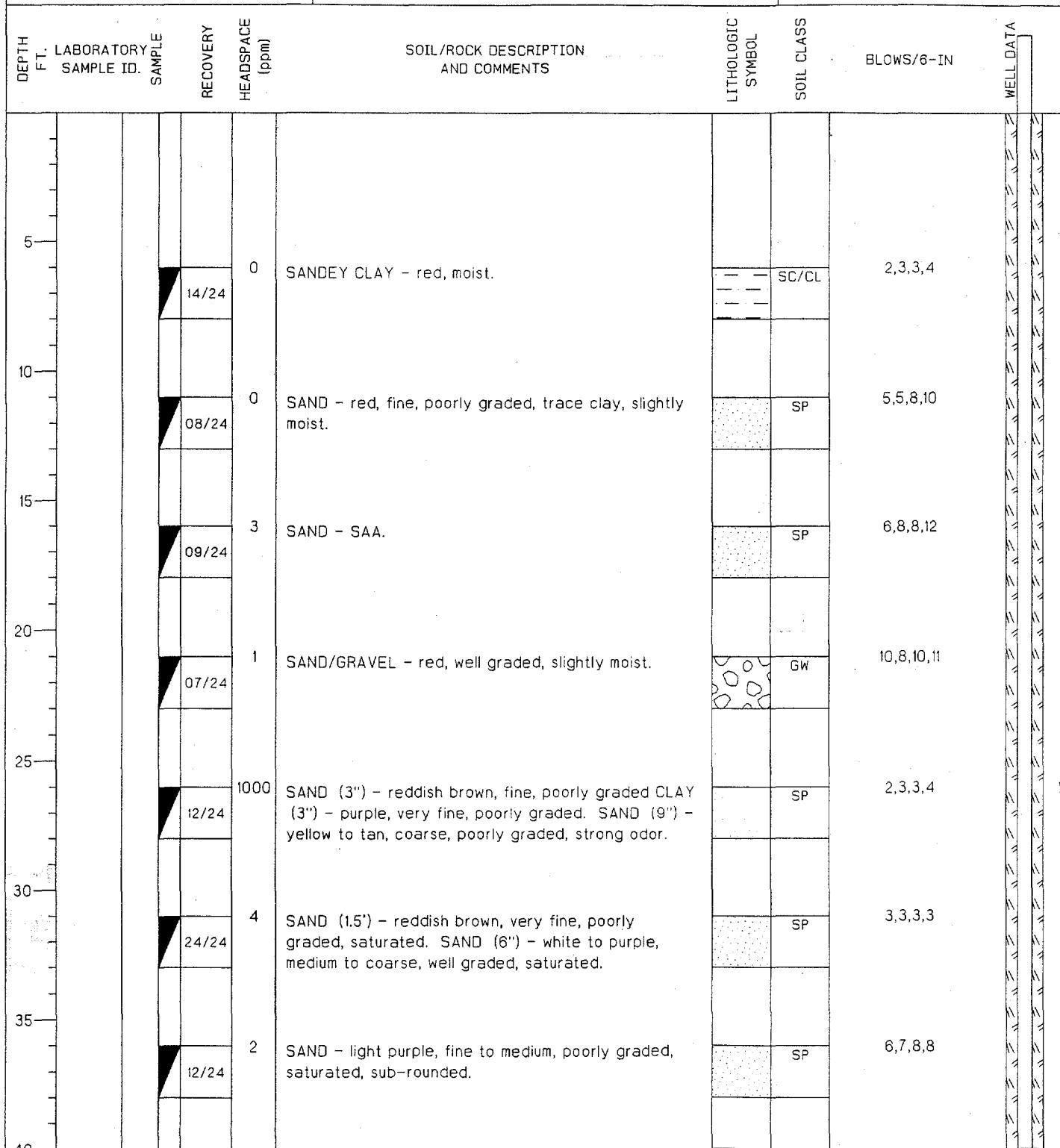
TITLE: NAVAL AIR STATION WHITING FIELD			LOG of WELL: WHF-15-2D		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 07/17/93		COMPLTD: 07/18/93		
METHOD: MUD ROTARY	CASE SIZE: 2 in.		SCREEN INT.: 104.6-109.6	PROTECTION LEVEL: D			
TOC ELEV.: 60.07 FT.	MONITOR INST.: OVA		TOT DPTH: 110FT.	DPHT TO 19.33 FT.			
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:			SITE: 15 - S.W. Landfill			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2							
85			Same as above, medium dense.				
90			same as above, dense.				
95			NO RECOVERY				
100			Same as above, medium dense.				
105			Same as above, dense.				
110			Same as above, loose.				
115							
120							

TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-15-2I		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 02/3/93		COMPLTD: 02/4/93				
METHOD: MUD ROTARY	CASE SIZE: 2 in.		SCREEN INT.: 50-60 FT		PROTECTION LEVEL: D				
TOC ELEV.: 60.18 FT.	MONITOR INST.: OVA		TOT DPTH: 62FT.		DPTH TO ↓ 20.7 FT.				
LOGGED BY: R. NELSON	WELL DEVELOPMENT DATE:				SITE: 15 - S.W. Landfill				
DEPTH F.T. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS			LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			SAND - light brown, fine to medium, poorly graded, dry.				SP	3,2,4,4	
10			CLAYEY SILT - gray, medium plasticity, saturated, firm, some sand.				CL	2,2,2,2	
15			CLAY - gray, plastic, saturated, soft, trace sand.				CH	1,1,3,5	
20			CLAYEY SILT - gray, medium plasticity, firm, some sand.				CL	10,10,12,11	
25			CLAYEY SAND - gray, medium to low plasticity, moist, firm.				SP	7,7,8,10	
30			CLAYEY SAND - gray, moist, firm.				SP	6,2,3,3	
35			SAND - gray, fine, poorly graded, saturated.				SP	10,12,13,17	
40			SAND - reddish brown, fine, poorly graded, loose, saturated.				SP	22,22,33,40	
45			SAND - orange to red to white, coarse, well graded.				SW	14,19,23,27	
50			SAND - orangish brown, fine, poorly graded.				SP	6,5,4,5	
55			SAND - light tan, fine to medium, poorly graded, saturated.				SP	7,8,12,12	
60			SAND - gray, fine, silty, well graded, saturated.				SP	7,7,7,8	
65			SAND - gray, fine to medium, trace coarse, poorly graded, saturated.				SP	6,9,8,11	

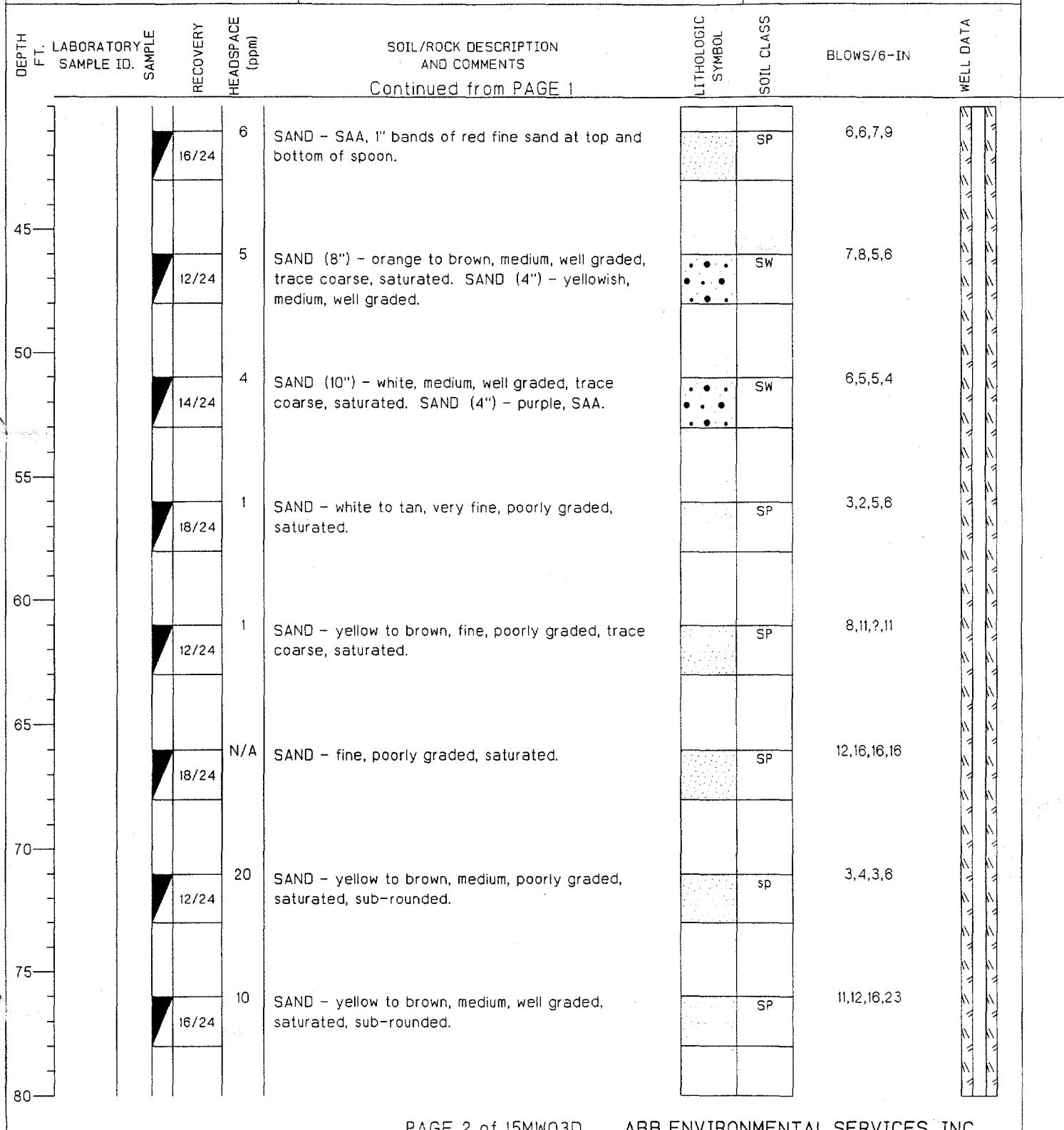
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-2S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/4/93	COMPLTD: 02/4/93
METHOD: HSA	CASE SIZE: 2	SCREEN INT.: 15-30 FT	PROTECTION LEVEL: D
TOC ELEV.: 60.18 FT.	MONITOR INST.: OVA	TOT DPTH: 37FT.	DPHT TO ↓ 19.34 FT.
LOGGED BY: R.Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



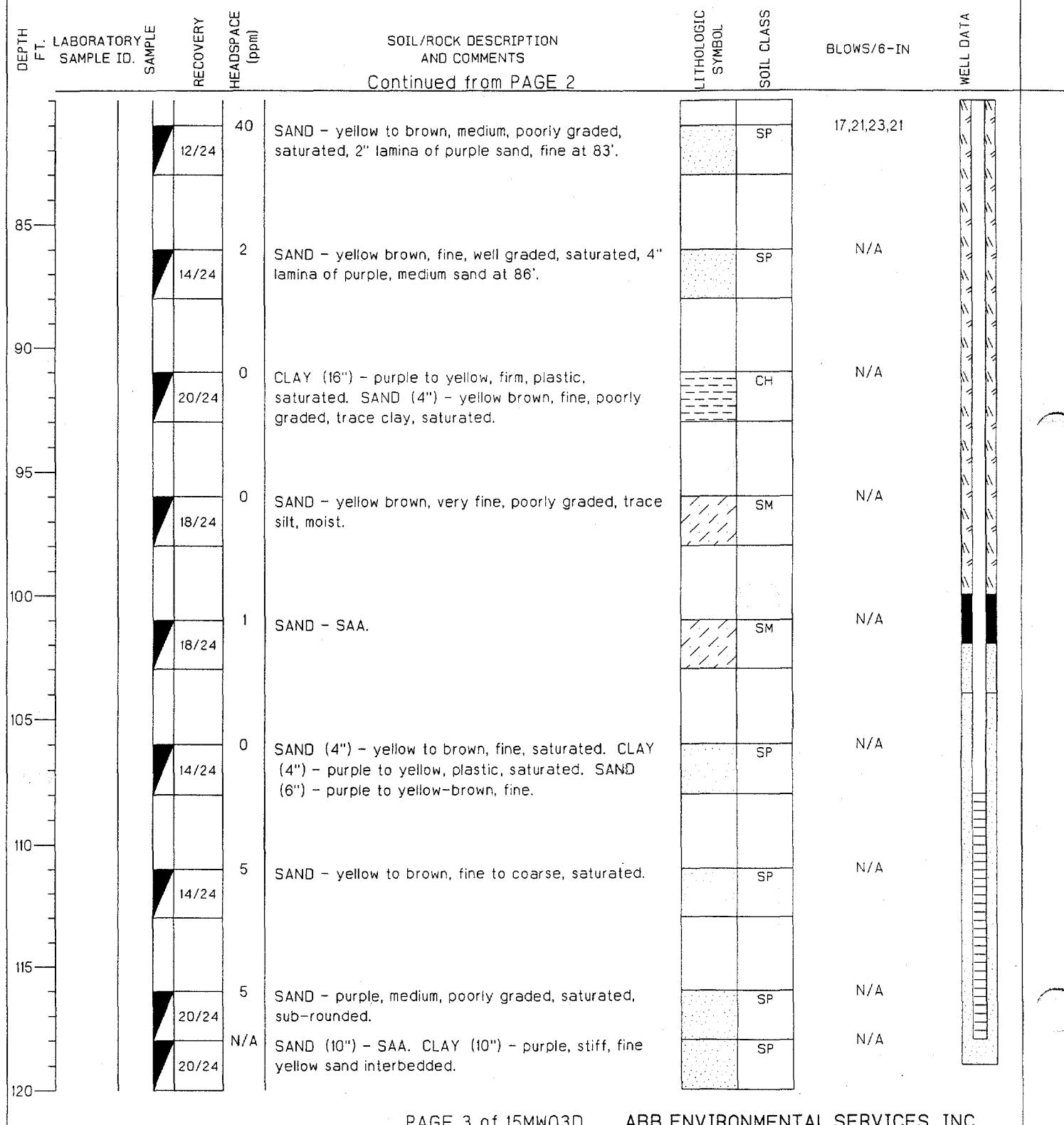
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/23/93	COMPLTD: 01/25/93
METHOD: MUD ROTARY	CASE SIZE: 2	SCREEN INT.: 108-118 FT.	PROTECTION LEVEL: D
TOC ELEV.: 69.61 FT.	MONITOR INST.: OVA	TOT DPTH: 119FT.	DPTH TO 26.2 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/23/93	COMPLTD: 01/25/93
METHOD: MUD ROTARY	CASE SIZE: 2	SCREEN INT.: 108-118 FT.	PROTECTION LEVEL: D
TOC ELEV.: 69.61 FT.	MONITOR INST.: OVA	TOT DPTH: 119FT.	DPHTH TO ∇ 26.2 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



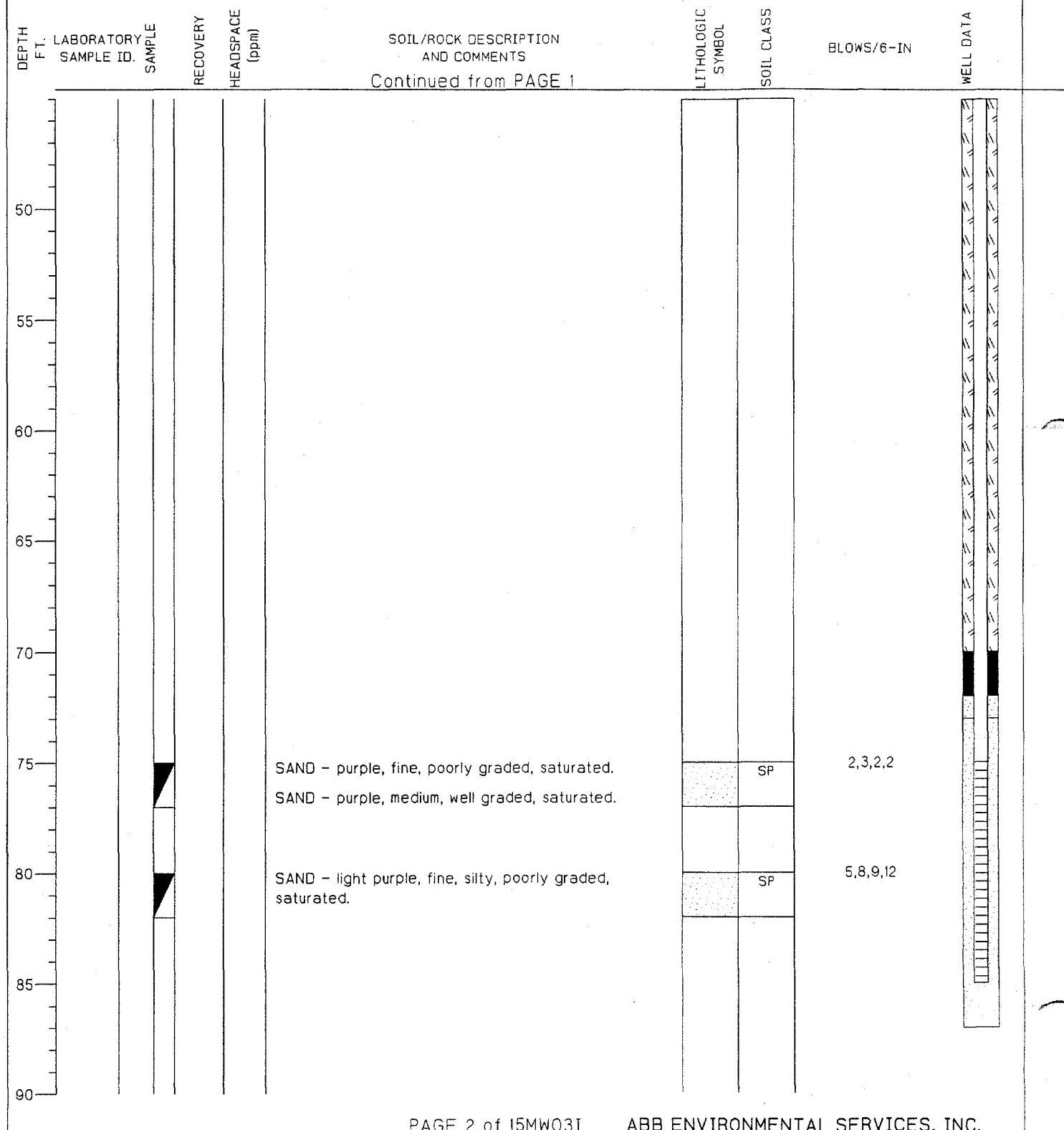
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/23/93	COMPLTD: 01/25/93
METHOD: MUD ROTARY	CASE SIZE: 2	SCREEN INT.: 108-118 FT.	PROTECTION LEVEL: 0
TOC ELEV.: 69.61 FT.	MONITOR INST.: OVA	TOT DPTH: 119FT.	DEPTH TO ∇ 26.2 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-3I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/2/93	COMPLTD: 02/2/93
METHOD: MUD ROTARY	CASE SIZE: 2	SCREEN INT.: 75-85 FT	PROTECTION LEVEL: D
TOC ELEV.: 69.72 FT.	MONITOR INST.: OVA	TOT DPTH: 87FT.	DPTH TO \neq 26.86 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5					SEE WHF-15-3D FOR LITHOLOGICAL DESCRIPTIONS.				
10									
15									
20									
25									
30									
35									
40									
45									

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-3I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/2/93	COMPLTD: 02/2/93
METHOD: MUD ROTARY	CASE SIZE: 2	SCREEN INT.: 75-85 FT	PROTECTION LEVEL: D
TOC ELEV.: 69.72 FT.	MONITOR INST.: OVA	TOT DPTH: 87FT.	DPTH TO ∇ 26.86 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-15-3S		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 02/1/93	COMPLTD: 02/1/93			
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 20-35 FT	PROTECTION LEVEL: D					
TOC ELEV.: 69.87 FT.	MONITOR INST.: OVA	TOT DPTH: 37FT.	DPTH TO ↓ 26.24 FT.					
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:				SITE: 15 - S.W. Landfill			
DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5								
10								
15				SAND - reddish brown, fine to medium, poorly graded, dry.	SP		5,6,6,6	
20				Same as above, alternating bands of pink and white.	SP		3,4,4,5	
25				SAND - gray to white, medium, poorly graded, saturated.	SP		3,2,2,3	
30				SAND - fine, silty, saturated.				
35								
40								

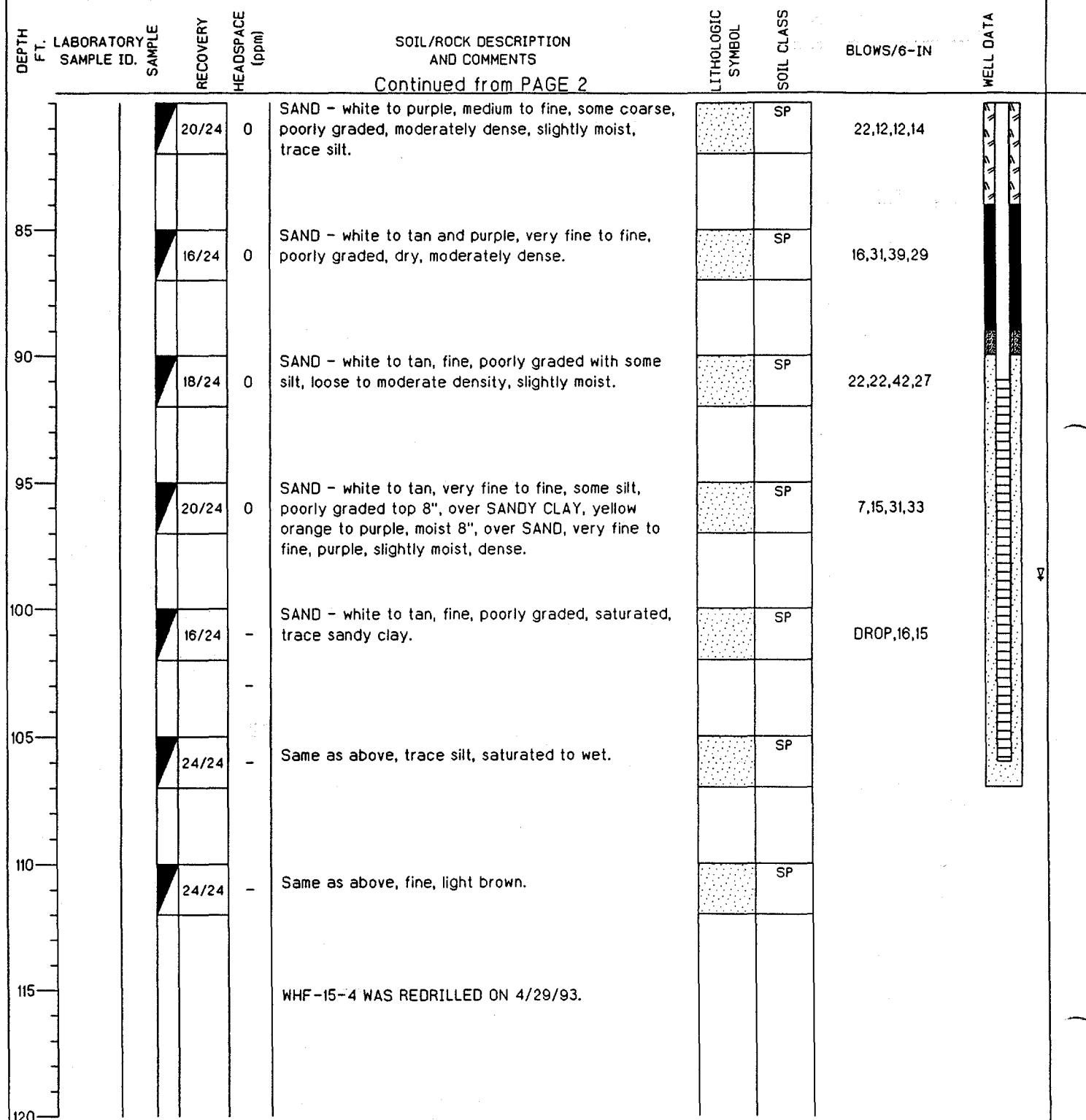
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/18/93	COMPLTD: 04/29/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 92-107 FT.	PROTECTION LEVEL: D
TOC ELEV.: 143.54 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.	DEPTH TO ↓ 98.8 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill

DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5	20/24	< 1	SAND - dark brown, fine, poorly graded, dry, loose, some organic content.	SP	1,1,1		
10	8/24	0	SAND - reddish brown, fine, poorly graded, dry, loose.	SP	2,2,3,2		
15	1/24	0	SAND - dark tan and yellowish orange bands, fine, poorly graded, dry.	SP	6,8,9,10		
20	6/24	0		SP	4,6,10,12		
24	24/24	0	Same as above, trace amounts of silt at 21 ft. b.s.	SP			
25	20/24	0	SAND - white, very fine, poorly graded, moderately dense, dry.	SP	8,7,11,14		
30	20/24	0	SAND - very fine to fine, poorly graded, moderately dense, trace amounts of coarse to very coarse sand.	SP	8,7,11,14		
35	12/24	0	SAND - white with bands of reddish brown fine to medium, poorly graded, loose, dry.	SP	5,6,10,13		
40				SP			

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/18/93	COMPLTD: 04/29/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 92-107 FT.	PROTECTION LEVEL: D
TOC ELEV.: 143.54 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.	DPHT TO ↓ 98.8 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill

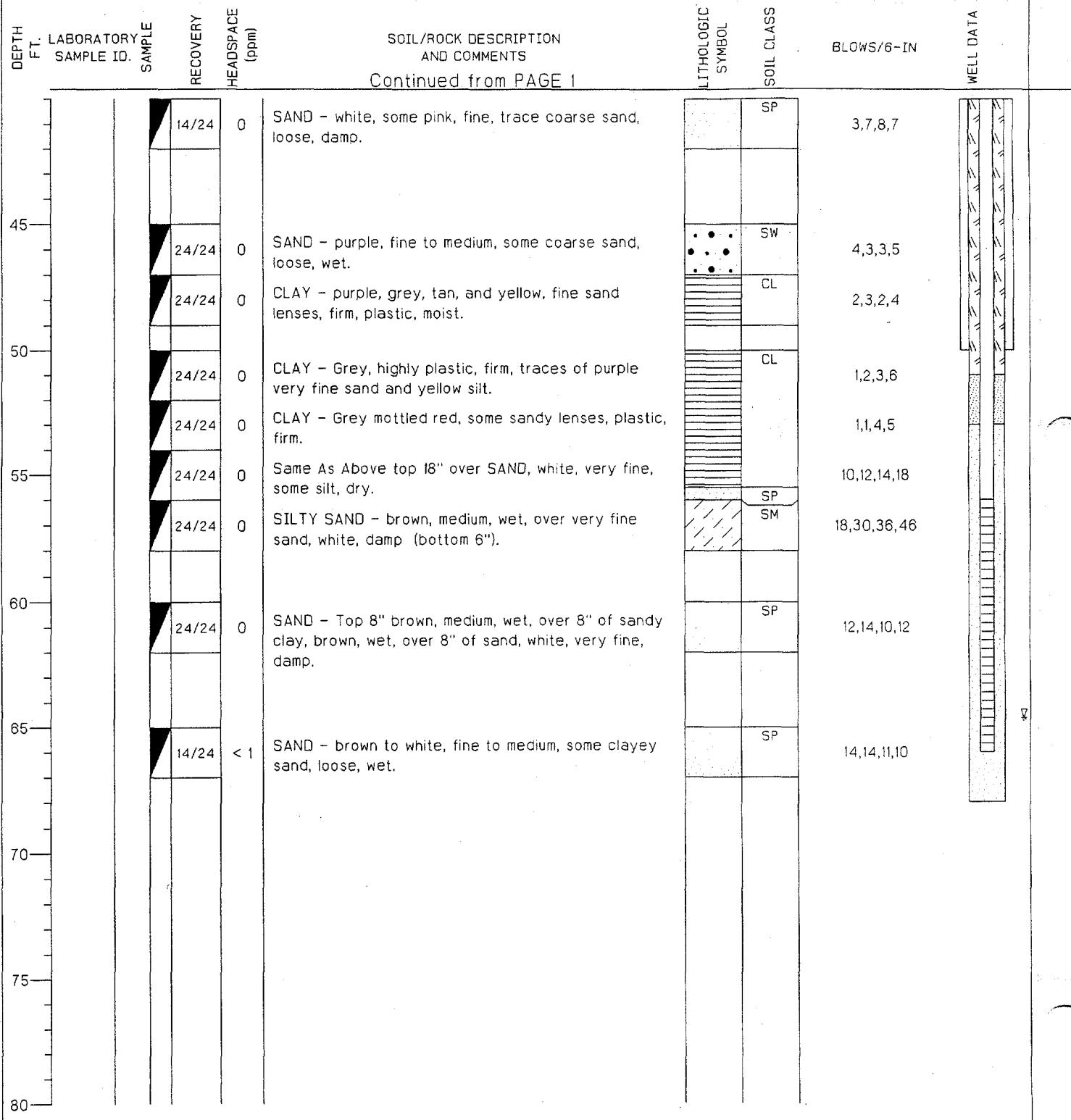
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1							
45	20/24	0	Same as above, trace coarse.	SP	SP	5,8,11,14	
50	24/24	0	Same as above.	SP	SP	8,13,23,27	
55	20/24	0	SAND - white, fine, trace silt, moderately dense, slightly moist, poorly graded.	SP	SP	6,11,15,17	
60	20/24	0	Same as above.	SP	SP	14,10,14,21	
65	20/24	0	Same as above, white to tan.	SP	SP	10,15,21,29	
70	18/24	0	SAND - white to tan, fine to medium, fairly graded, moderately dense, slightly moist.	SP	SP	22,28,29,28	
75	18/24	0	SAND - white, very fine to fine, poorly graded, moderately dense, dry.	SP	SP	17,11,25,52	
80	18/24	1	SAND - white, very fine to fine, purple bands, poorly graded, loose, dry.	SP	SP	18,27,31,28	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/18/93	COMPLTD: 04/29/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 92-107 FT.	PROTECTION LEVEL: D
TOC ELEV.: 143.54 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.	DPTH TO ↓ 98.8 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-15-5		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 02/05/93	COMPLTD: 02/08/93			
METHOD: Mud Rot	CASE SIZE: 6 in.			SCREEN INT.: 56-66 FT.	PROTECTION LEVEL: D			
TOC ELEV.: 104.32 FT.	MONITOR INST.: OVA			TOT DPTH: 68FT.	DPTH TO 64.63 FT.			
LOGGED BY: N. Haglin	WELL DEVELOPMENT DATE:			SITE: 15 - S.W. Landfill				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SILTY SAND - dark red, fine, medium dense, damp.	SM		3,5,5,7	
10				Same as above.	SM		-,-,-,-	
15				SAND - reddish tan to white, fine, loose, dry.	SP		2,5,8,11	
20				Same as above, more white sand.	SP		4,5,7,10	
25				SAND - white, very fine to fine, loose, dry.	SP		5,5,6,7	
30				Same As Above, banded dark red and white.	SP		5,11,12,15	
35				SAND - fine, banded rust and white, damp.	SP		6,9,12,12	
40					SP			

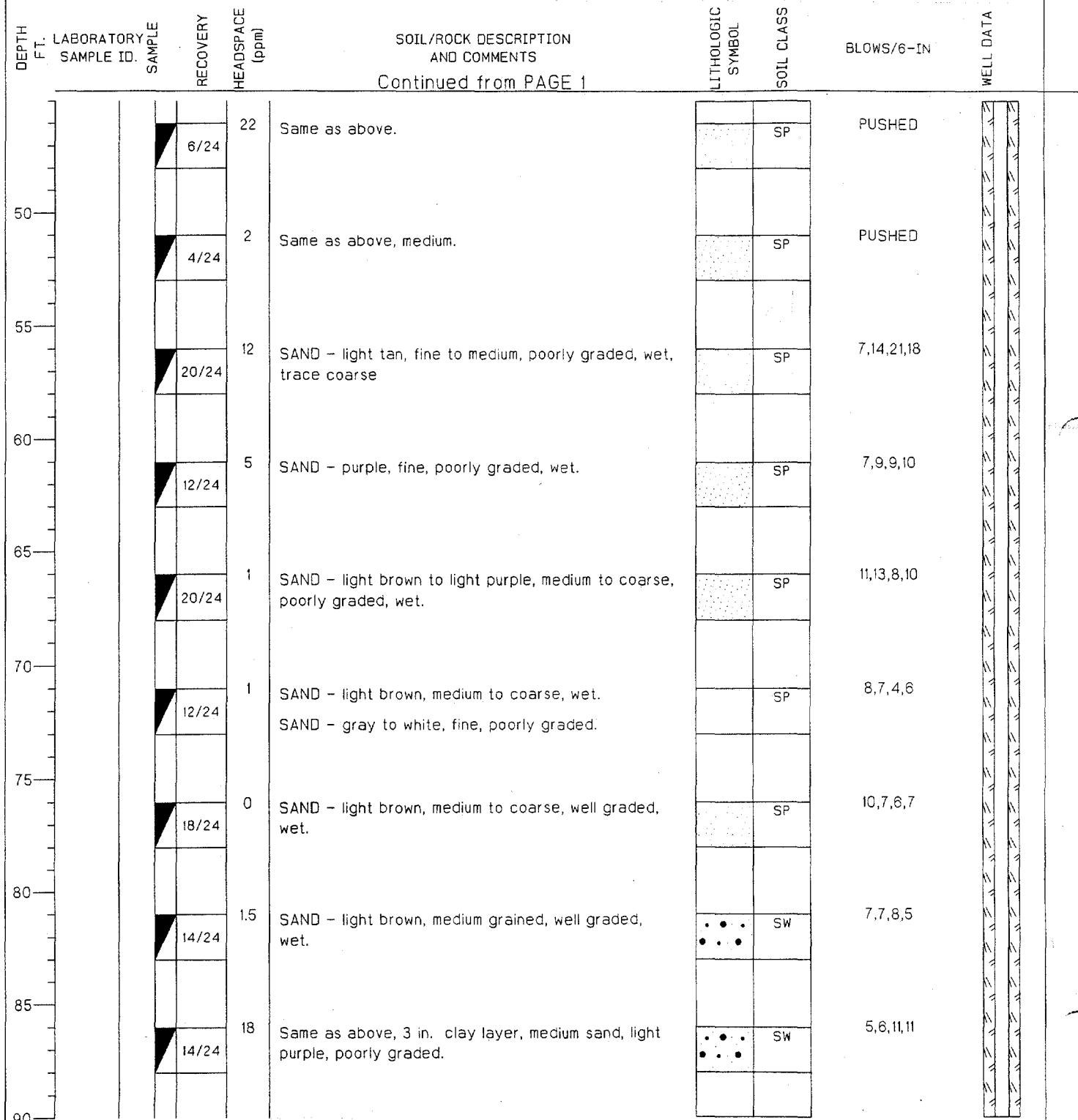
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/05/93	COMPLTD: 02/08/93
METHOD: Mud Rot	CASE SIZE: 6 in.	SCREEN INT.: 56-66 FT.	PROTECTION LEVEL: D
TOC ELEV.: 104.32 FT.	MONITOR INST.: OVA	TOT DPTH: 68FT.	DPTH TO ∇ 64.63 FT.
LOGGED BY: N. Haglin	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



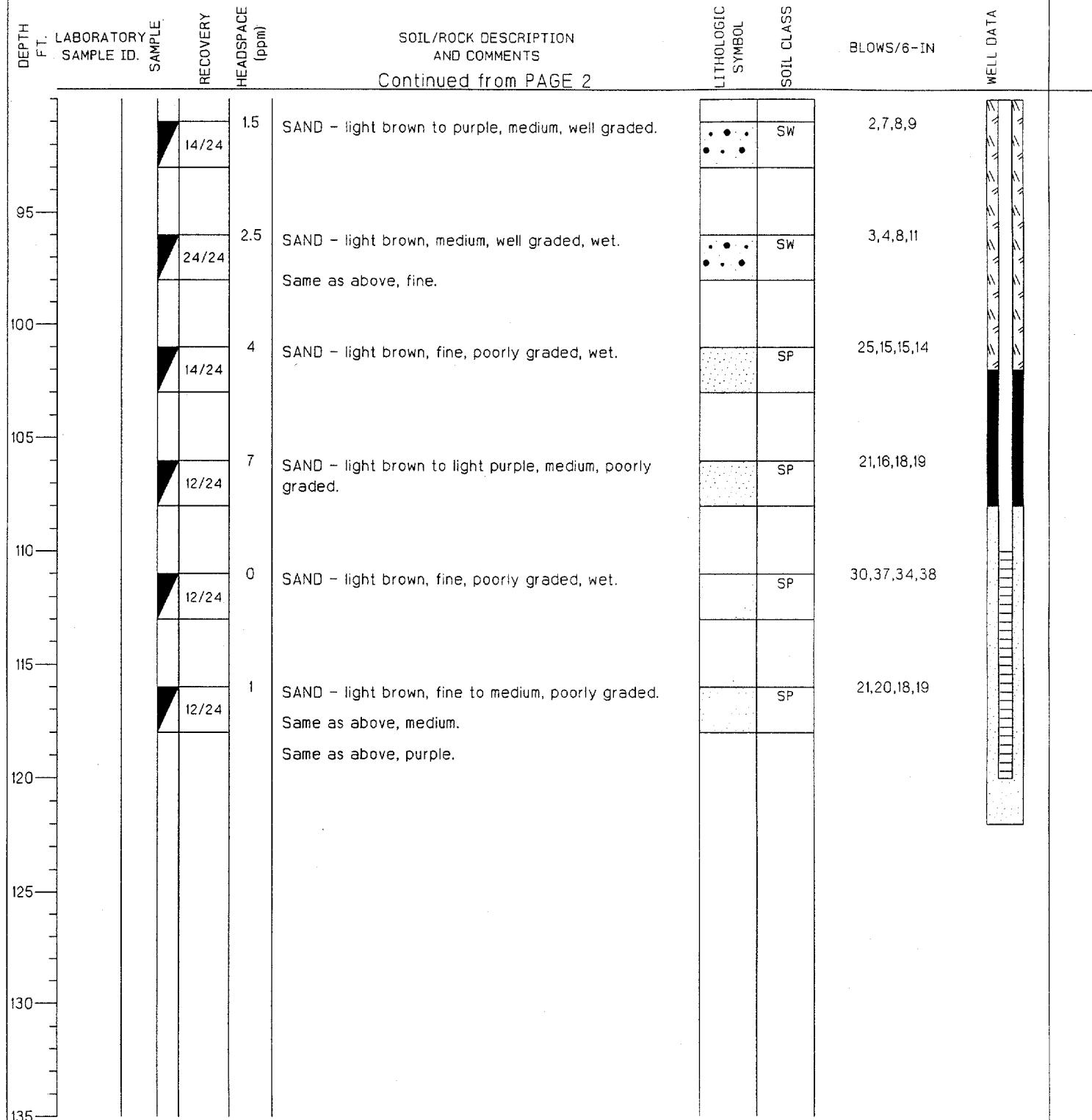
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-6D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/5/93	COMPLTD: 02/8/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 110-120 FT.	PROTECTION LEVEL: D
TOC ELEV.: 75.14 FT.	MONITOR INST.: OVA	TOT DPTH: 122FT.	DPTH TO 35.33 FT.
LOGGED BY: R.Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5							
10	16/24	0	SANDY SILT - reddish brown, medium, poorly graded, slightly moist.	/\ / \ / \ /	SM	3,3,3,3	
15	20/24	1	Same as above.	/\ / \ / \ /	SM	3,3,3,5	
20	18/24	1	SAND - reddish brown, fine, trace silt, poorly graded, saturated. SAND - white to gray, fine, poorly graded.	/\ / \ / \ /	SP	7,11,12,15	
25	14/24	1	SAND - reddish brown, fine, poorly graded, trace silt, wet.	/\ / \ / \ /	SP	5,9,10,12	
30	18/24	120	SAND - light purple, fine, poorly graded, silt, wet.	██████	SP	5,8,8,7	
35	14/24	160	SAND - orangish brown to gray, fine, trace silt, poorly graded.	██████	SP	4,5,5,6	
40	8/24	3	SAND - tan, fine, poorly graded, silty.	██████	SP	PUSHED	
45	10/24	160	SAND - gray, fine, poorly graded, wet.	██████	SP	PUSHED	

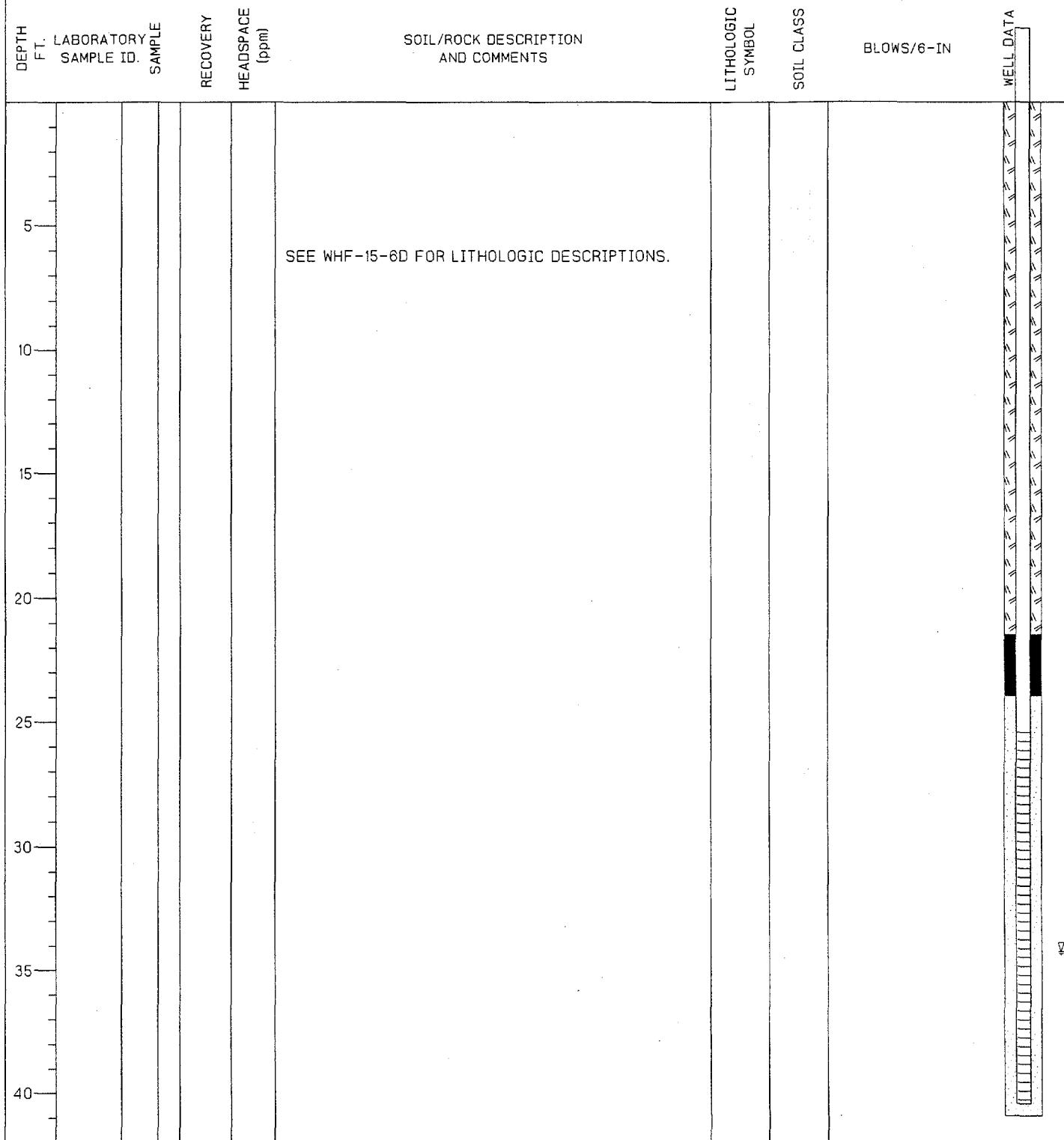
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-6D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/5/93	COMPLTD: 02/8/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 110-120 FT.	PROTECTION LEVEL: D
TOC ELEV.: 75.14 FT.	MONITOR INST.: OVA	TOT DPTH: 122FT.	DPTH TO § 35.33 FT.
LOGGED BY: R.Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-6D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/5/93	COMPLTD: 02/8/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 110-120 FT.	PROTECTION LEVEL: D
TOC ELEV.: 75.14 FT.	MONITOR INST.: OVA	TOT DPTH: 122FT.	DPTH TO V 35.33 FT.
LOGGED BY: R.Nelson	WELL DEVELOPMENT DATE:		SITE: 15 - S.W. Landfill



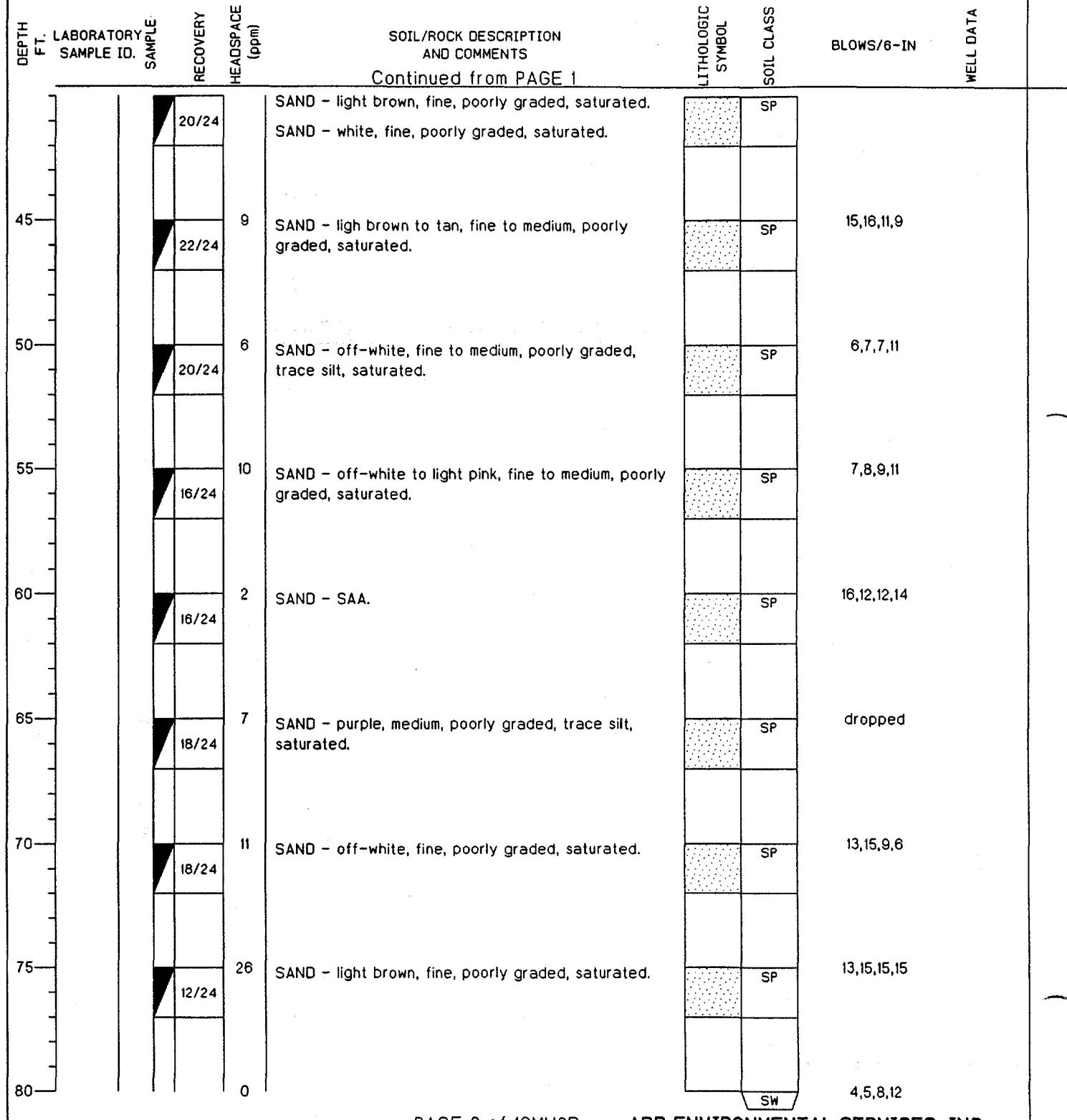
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-15-6S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/8/93	COMPLTD: 02/8/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 25-40 FT.	PROTECTION LEVEL: D
TOC ELEV.: 74.35 FT.	MONITOR INST.: OVA	TOT DPTH: 41FT.	DPHT TO 34.32 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:	SITE: 15 - S.W. Landfill	



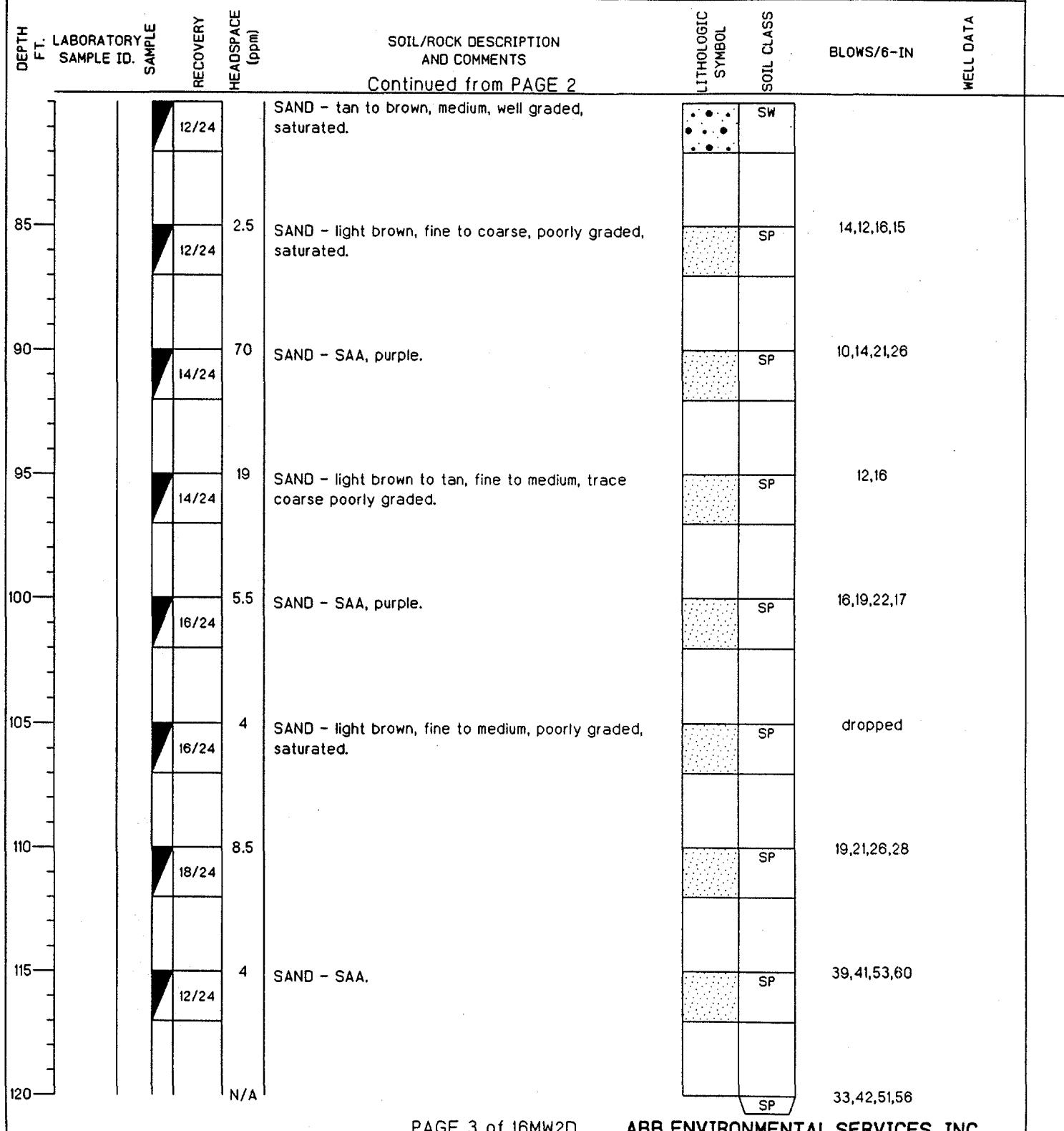
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-20
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO ♀ FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Plnt.

DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0	SAND - light brown, fine to medium, poorly graded, dry.		SP		4,4,7,5
10			0	SILTY SAND - reddish brown, poorly graded, dry.		SP		4,3,5,4
15			2	SILTY SAND - reddish brown, poorly graded, trace coarse, dry.		SP		6,8,12,14
20			1	SILTY SAND - SAA.		SP		5,6,7,9
25			0	SAND - white to tan, very fine, poorly graded, grade to SANDY CLAY - white, yellow mottling, firm, dry.		SP		6,9,8,5
30			0	SAND - off-white, fine, poorly graded, dry.		SP		9,11,12,14
35			0	SAND - SAA, saturated.		SP		6,6,7,9
40			2			SP		4,5,9,16

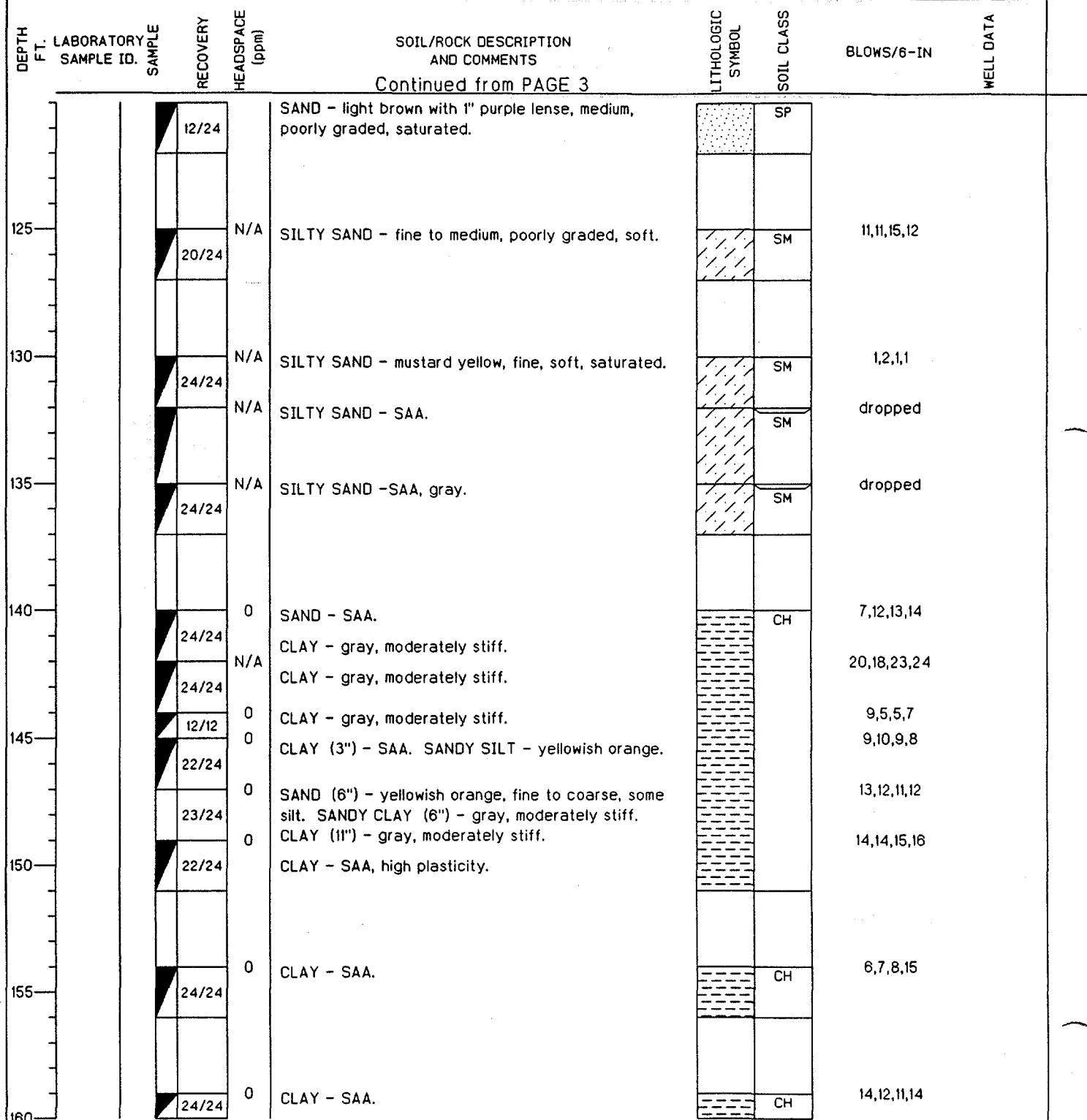
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO ↓ FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Pint.



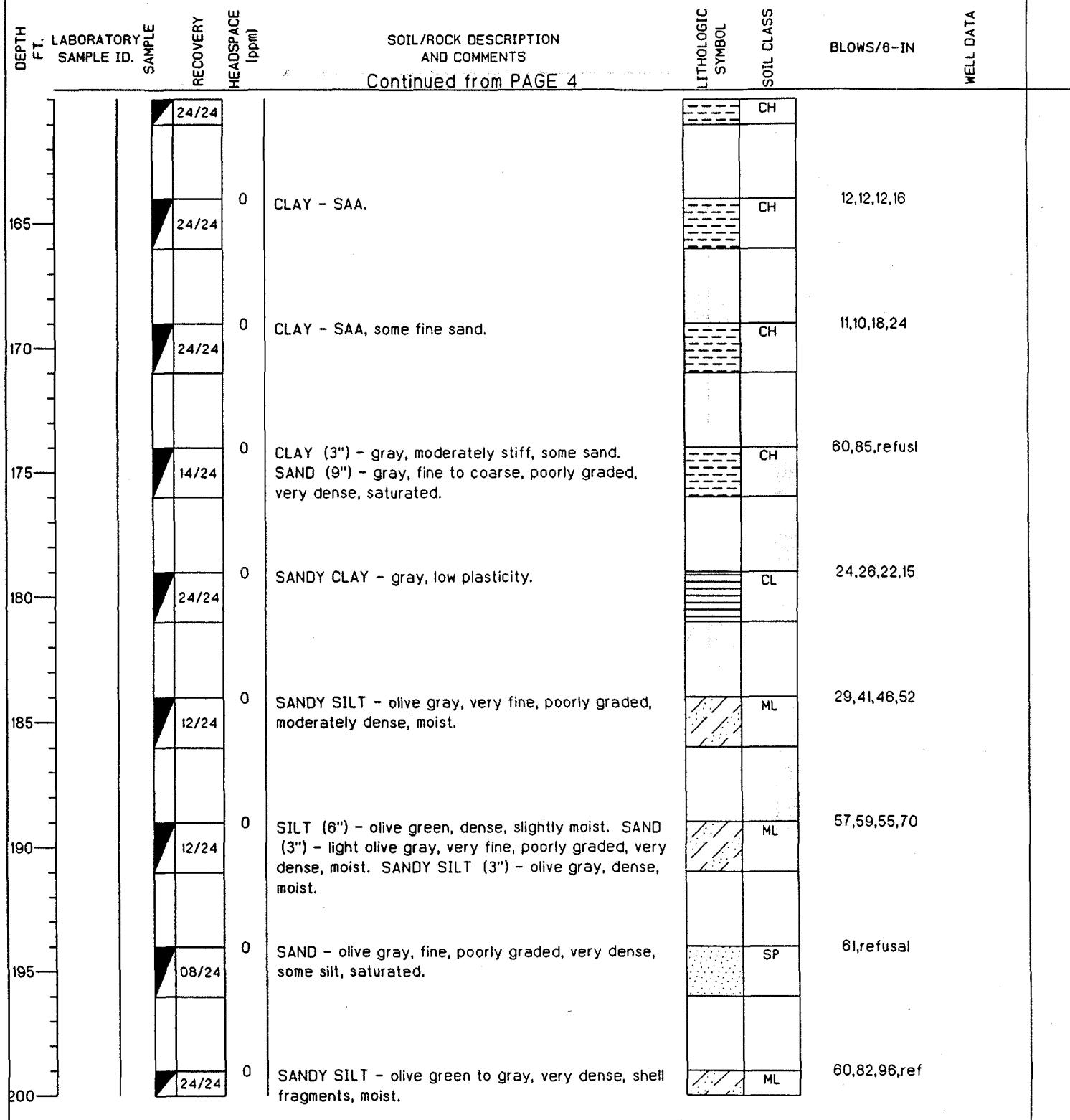
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO V FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Plnt.



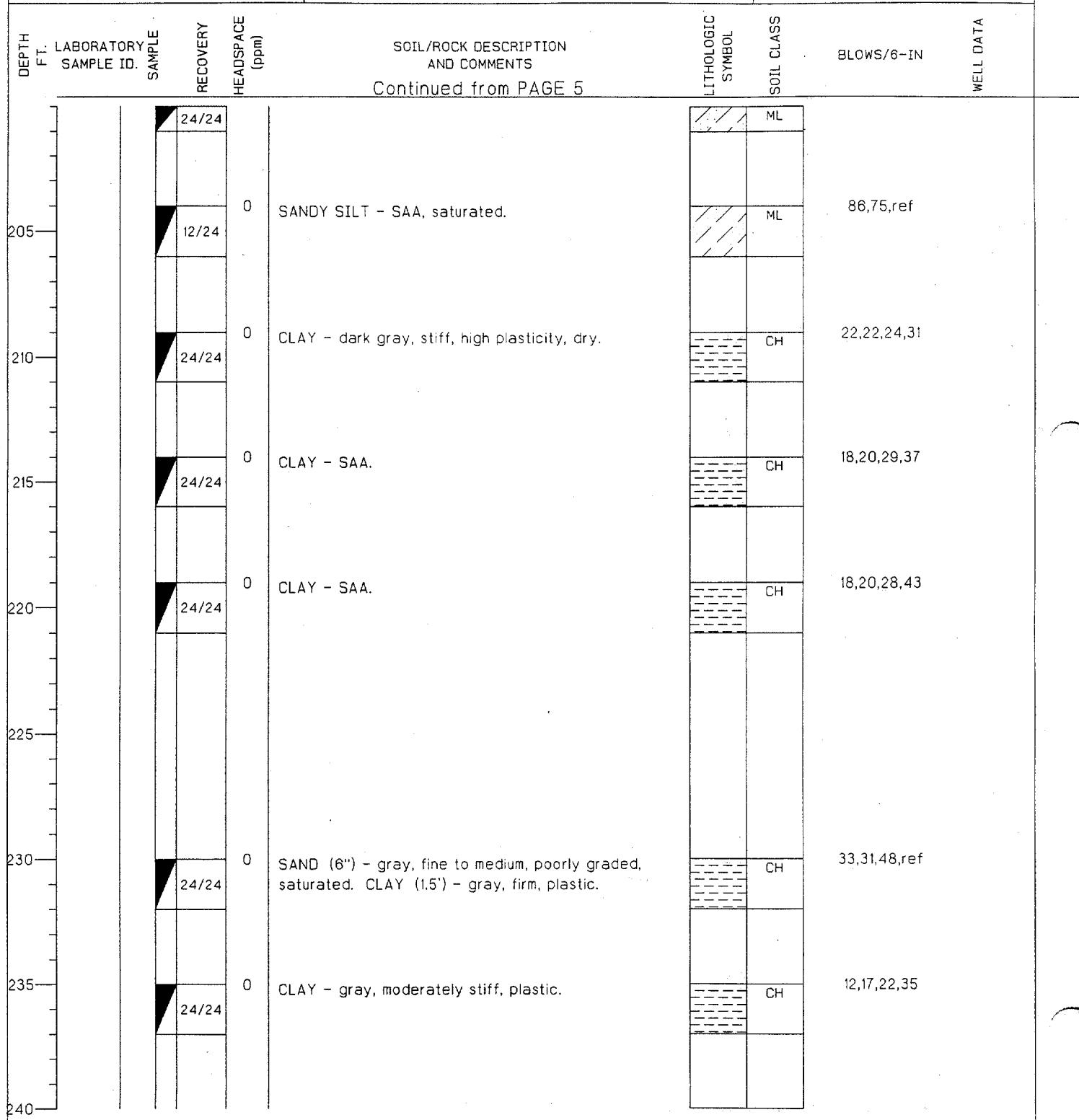
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO ↓ FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Pnt.



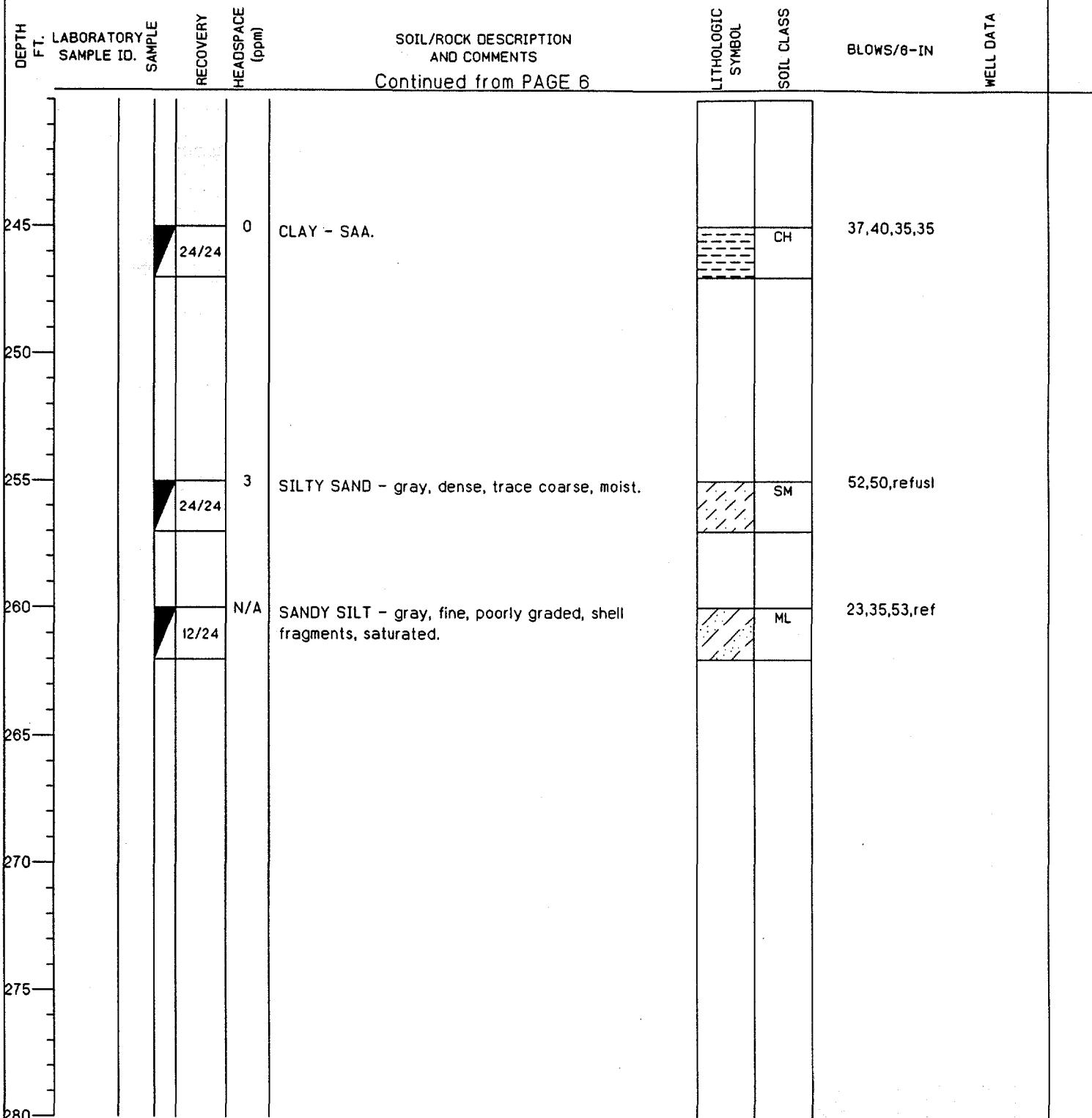
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO ↓ FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A	SITE: 16 - Wastewater Plnt.	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 262FT.	DPTH TO $\frac{1}{2}$ FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Plnt.



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2D	BORING NO. WHF-16-2D
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/09/93	COMPLTD: 03/4/93
METHOD: MUD ROT.	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 282FT.	DPHT TO V FT.
LOGGED BY: R. Nelson, G.K.	WELL DEVELOPMENT DATE: N/A		SITE: 16 - Wastewater Plnt.



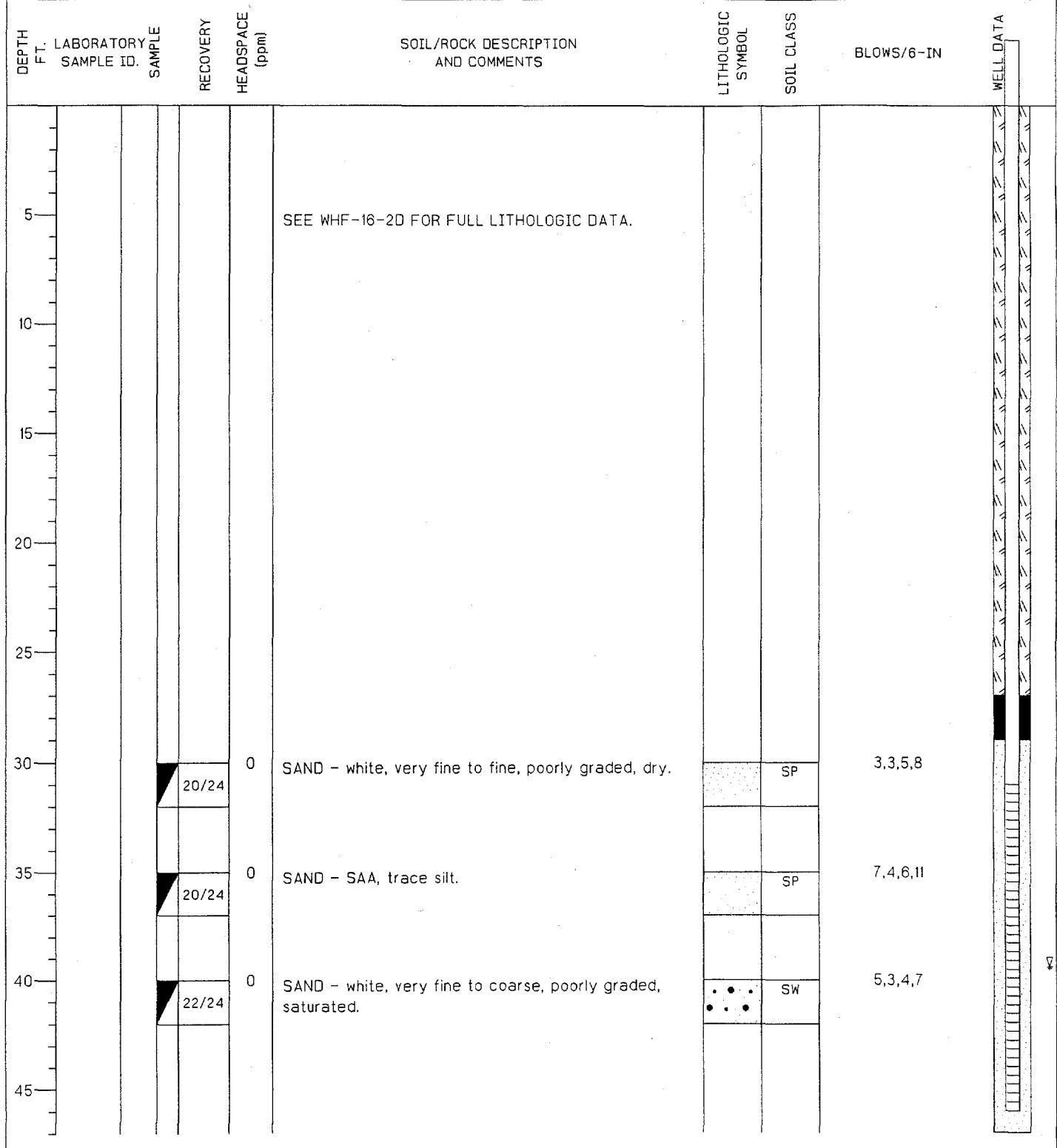
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/18/93	COMPLTD: 02/18/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 117-127 FT	PROTECTION LEVEL: D
TOC ELEV.: 80.71 FT.	MONITOR INST.: OVA	TOT DPTH: 127.5FT.	DPTH TO 36.52 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 16 - Open Disposal/Burn Area

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5					SEE WHF-16-2D FOR FULL LITHOLOGIC DATA.				
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/18/93	COMPLTD: 02/18/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 117-127 FT	PROTECTION LEVEL: D
TOC ELEV.: 80.71 FT.	MONITOR INST.: OVA	TOT DPTH: 127.5FT.	DPTH TO 36.52 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 16 - Open Disposal/Burn Area

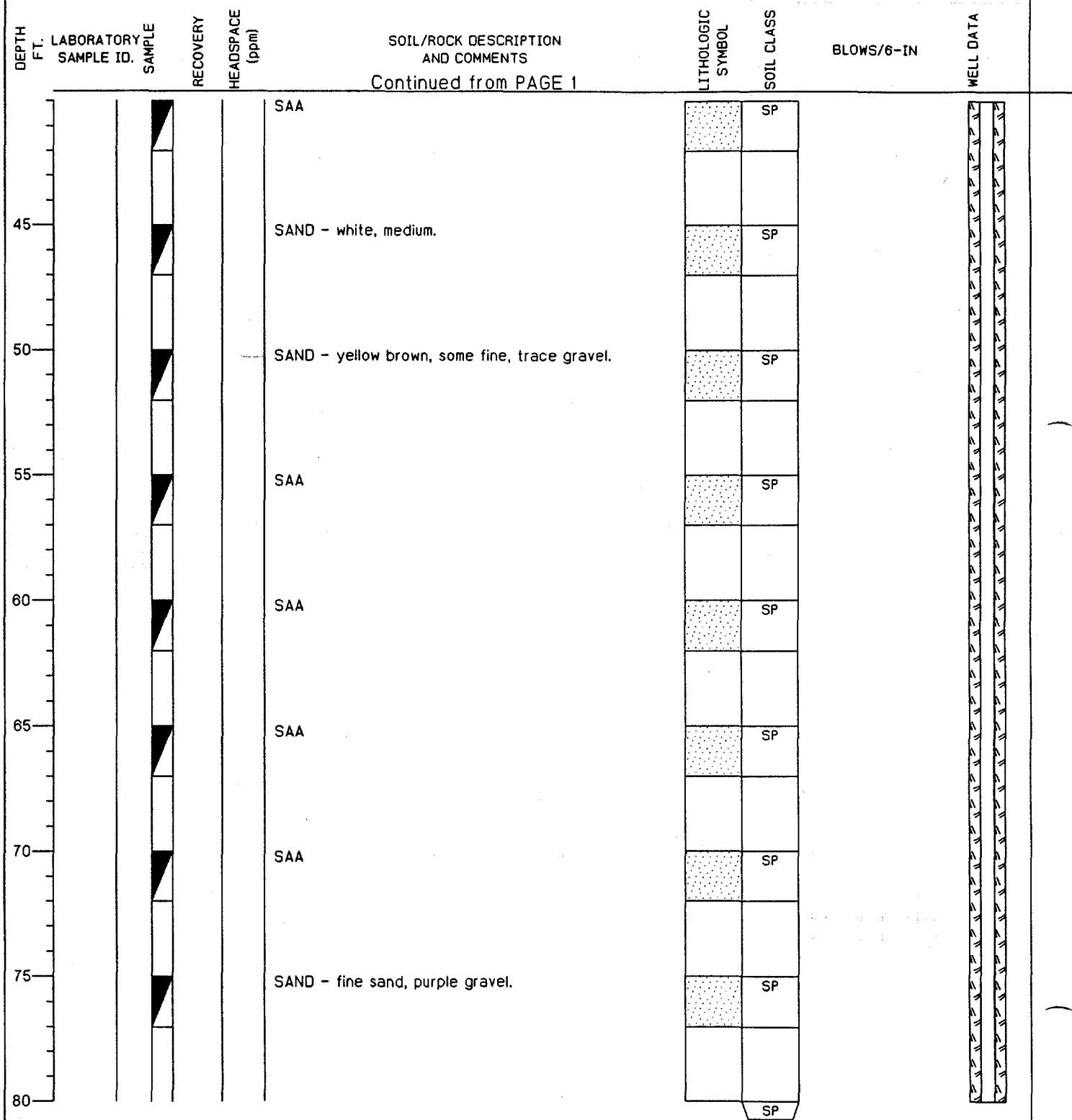
DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
			Continued from PAGE 1					
70								
75								
80								
85								
90								
95								
100								
105								
110								
115	06/24	N/A	SAND - light brown, medium, poorly graded, saturated, purple lamina.		SP		12,18,18,37	
120	08/24	N/A	SAND - SAA.		SP		38,30,60,48	
125	16/24	N/A	SAND - tan, medium, poorly graded, trace gravel, saturated, rounded.		SP		20,20,20,24	
130								

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-2S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/21/93	COMPLTD: 02/21/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 31-46 FT	PROTECTION LEVEL: D
TOC ELEV.: 83.75 FT.	MONITOR INST.: OVA	TOT DPTH: 46FT.	DPTH TO V 39.41 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 16 - Open Disposal/Burn Area

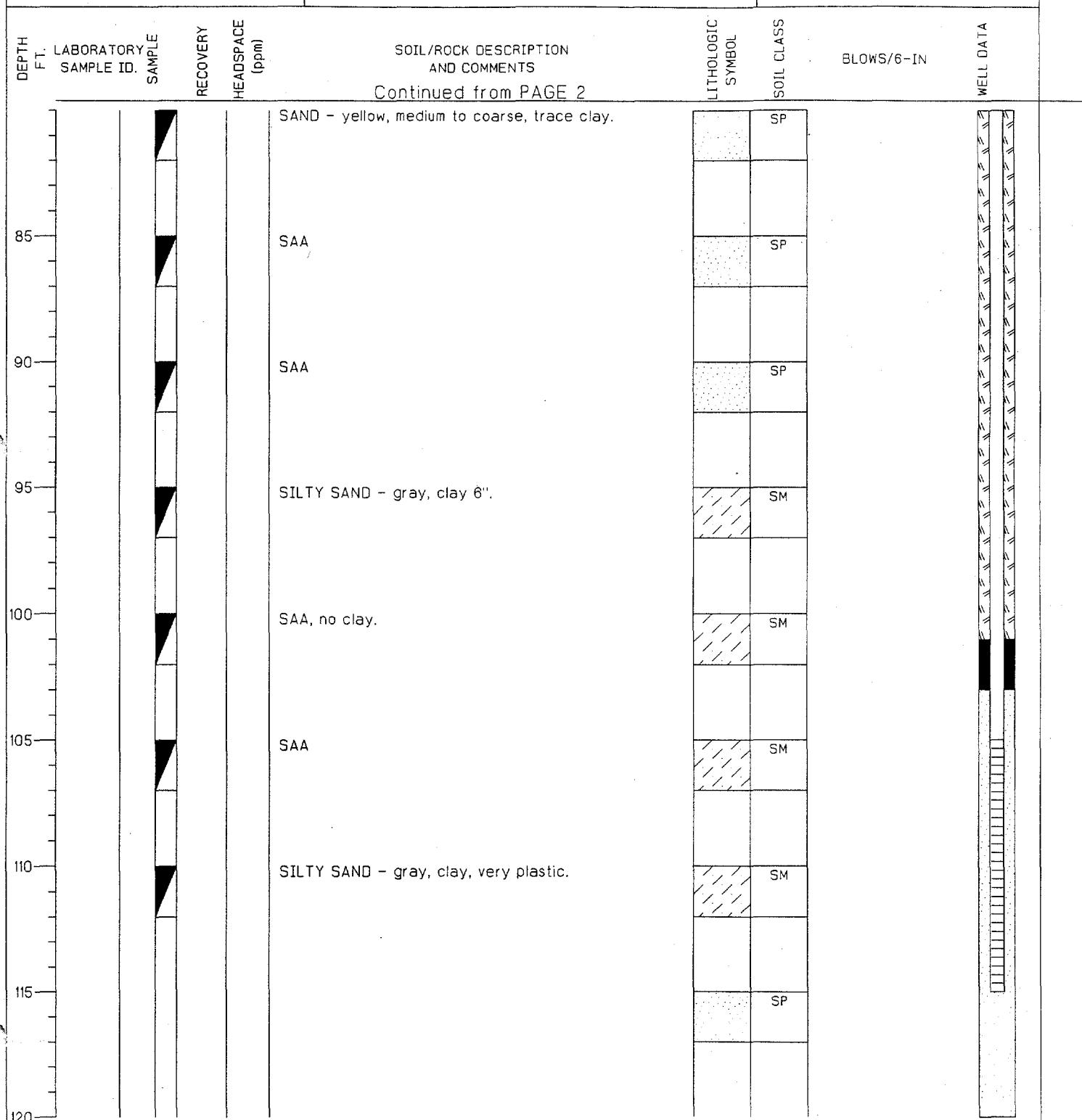


TITLE: NAVAL AIR STATION WHITING FIELD			LOG of WELL: WHF-16-3D	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 01/22/93	COMPLTD: 01/26/93			
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 105-115 FT	PROTECTION LEVEL: D				
TOC ELEV.: 51.47 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPTH TO ↓ 10.32 FT.				
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:			SITE: 16 - S.W. Landfill			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			SAND - light brown, well sorted.		SP		
10			SAND - some fines, wet.		SP		
15			SAND - red brown.		SP		
20			SAND - SAA		SP		
25			SAND - yellow to tan.		SP		
30			SAND - yellow to purple, fine.		SP		
35			SAA		SP		
40							

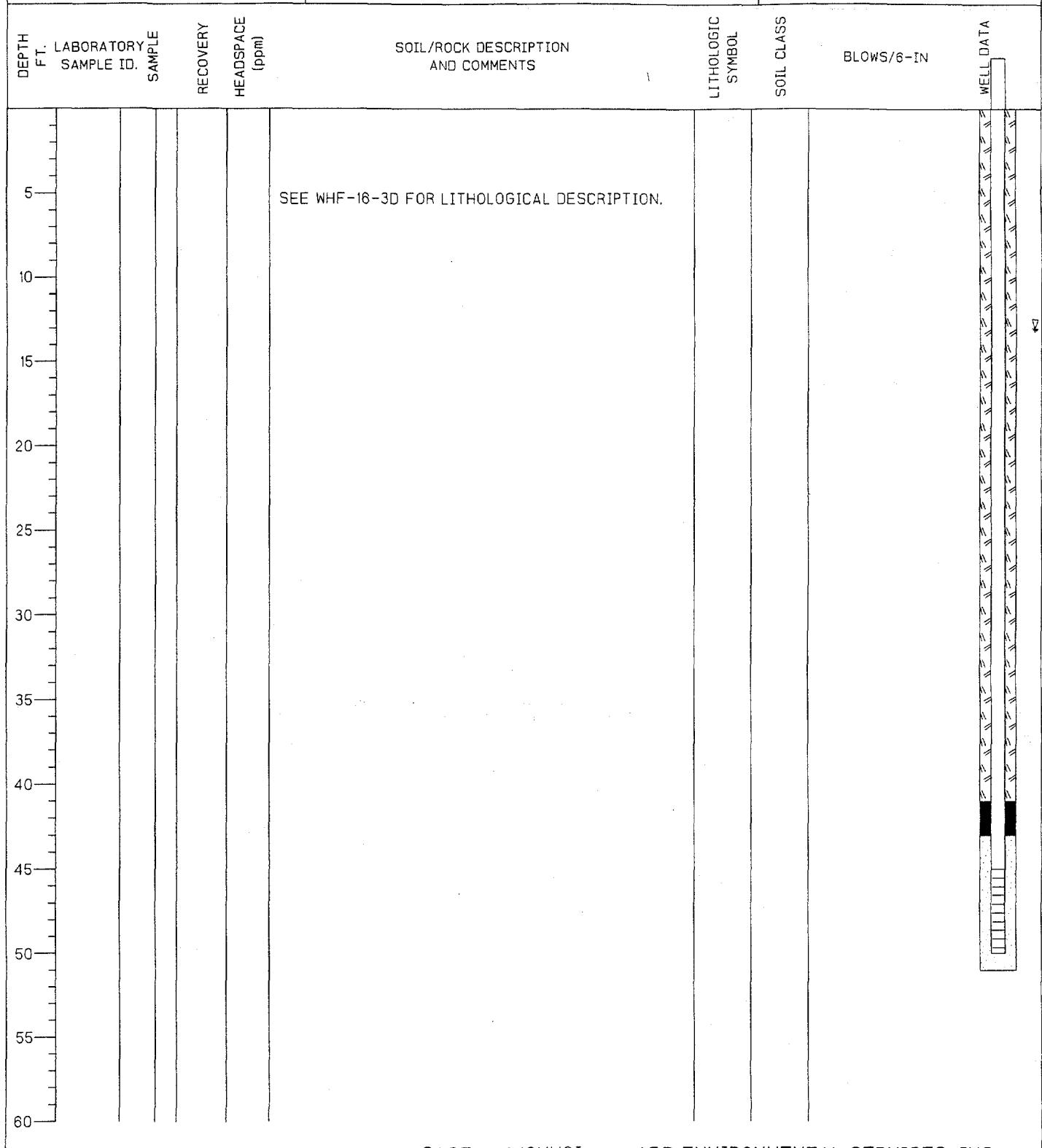
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/22/93	COMPLTD: 01/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 105-115 FT	PROTECTION LEVEL: D
TOC ELEV: 51.47 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPTH TO 10.32 FT.
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:	SITE: 16 - S.W. Landfill	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-3D	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/22/93	COMPLTD: 01/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 105-115 FT	PROTECTION LEVEL: D
TOC ELEV.: 51.47 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPTH TO ∇ 10.32 FT.
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:	SITE: 16 - S.W. Landfill	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-3I	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/26/93	COMPLTD: 01/26/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 45-50 FT	PROTECTION LEVEL: D
TOC ELEV.: 51.54 FT.	MONITOR INST.: OVA	TOT DPTH: 22FT.	DPTH TO 13.04 FT.
LOGGED BY: W. Colby-George	WELL DEVELOPMENT DATE:	SITE: 16 - S.W. Landfill	

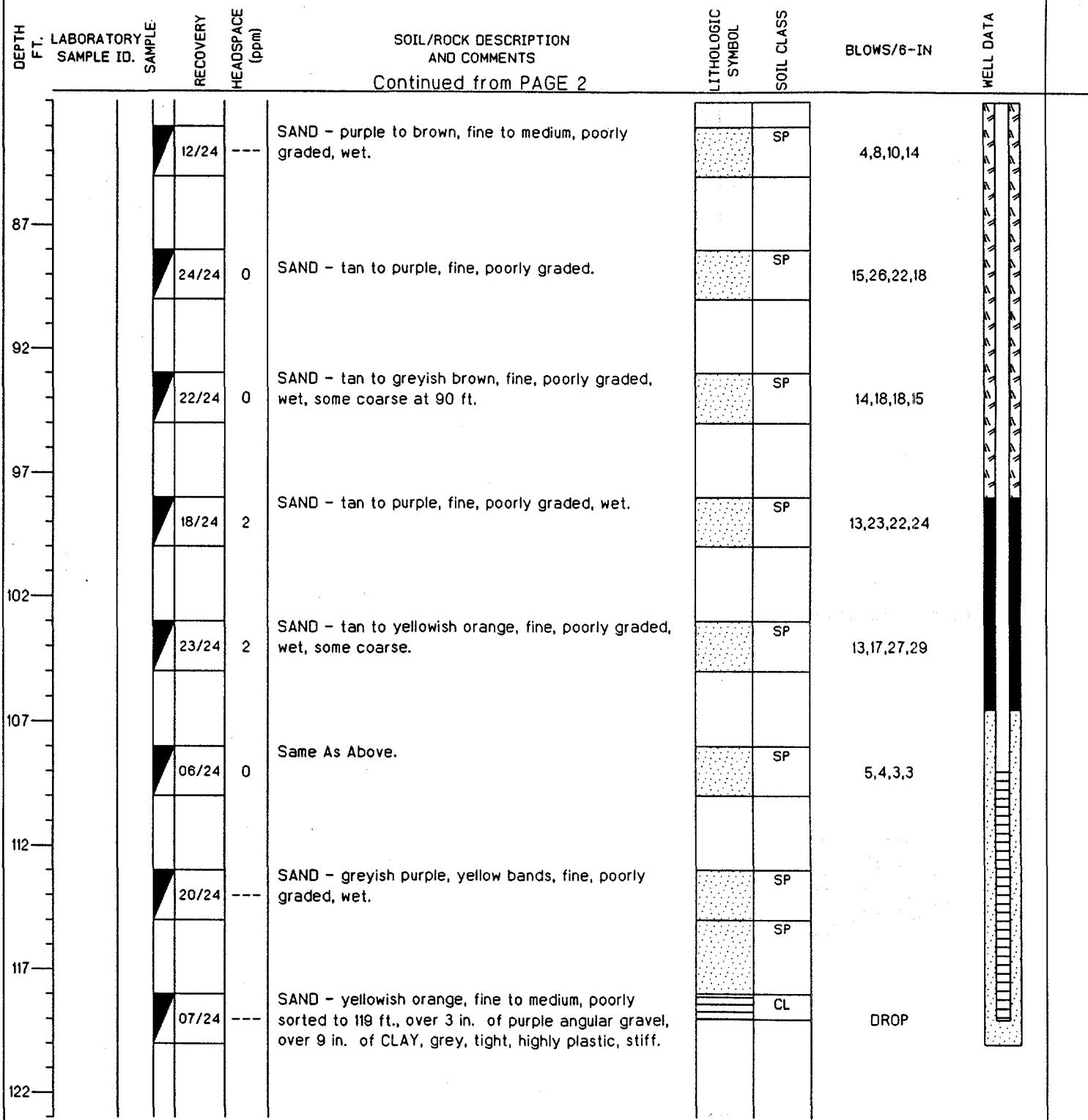


TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-16-4D		BORING NO. N/A		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 02/02/93	COMPLTD: 02/18/93			
METHOD: MUD ROT.	CASE SIZE: 6" & 2"		SCREEN INT.: 109-119 FT	PROTECTION LEVEL: D				
TOC ELEV.: 52.95 FT.	MONITOR INST.: OVA		TOT DPTH: 121FT.	DPTH TO ↓ 14.16 FT.				
LOGGED BY: M. Alvarez	WELL DEVELOPMENT DATE:				SITE: 16 - Wastewater Pit.			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS		
					BLOWS/6-IN			
5		18/24	SILTY SAND - Light brown, poorly graded, slightly plastic, loose, moist.		SM	3,5,7,18		
10		22/24	Same As Above, yellowish brown, 1 in. clay lense.		SM			
15		22/24	SAND - tan to reddish brown, fine to medium, 2" layer of sandy silt, loose, and wet.		SP			
20		10/24	SAND - tan, fine, poorly graded, loose, wet.		SP			
25		20/24	SAND - tan, fine to coarse, little fine gravel, trace silt, well graded, loose, wet.		SW			
30		04/24	SAND - tan, coarse, loose, poorly graded, wet.		SP			
35		20/24	SAND - tan, coarse, some medium to fine sand, well graded, wet.		SW			
40		12/24	Same As Above.		SW			

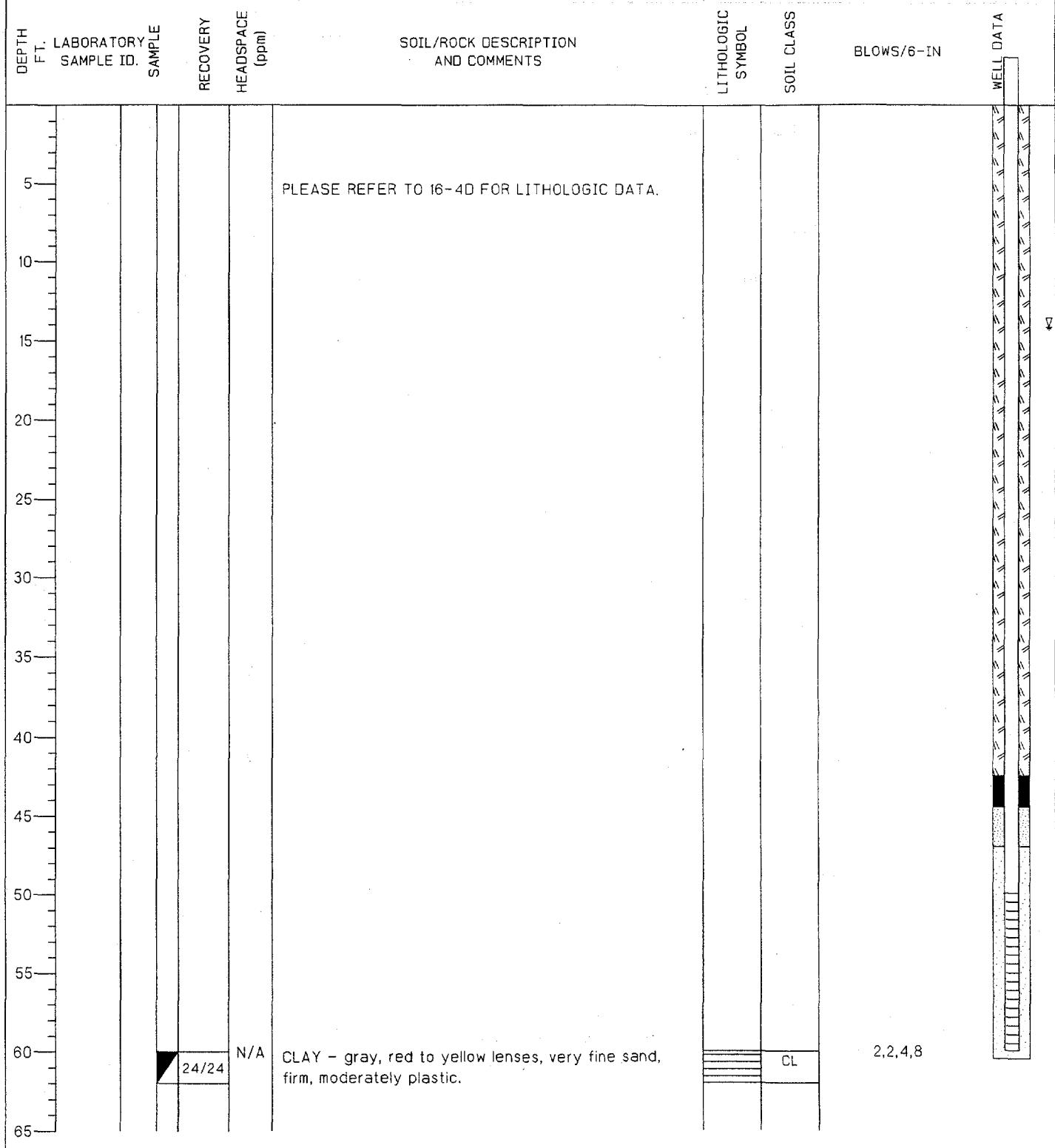
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-4D	BORING NO. N/A
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/02/93	COMPLTD: 02/18/93
METHOD: MUD ROT.	CASE SIZE: 6" & 2"	SCREEN INT.: 109-119 FT	PROTECTION LEVEL: D
TOC ELEV.: 52.95 FT.	MONITOR INST.: OVA	TOT DPTH: 121FT.	DPHT TO ↓ 14.16 FT.
LOGGED BY: M. Alvarez	WELL DEVELOPMENT DATE:	SITE: 16 - Wastewater Plt.	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1								
46		12/24	2	SAND - purple to yellow, fine, trace silt, poorly graded, wet.		SP		
51		08/24	2.5	SAND - pinkish tan, fine to medium, poorly graded, wet.		SP		
56		08/24	2.5	Same As Above.		SP		
61		08/24	5	SAND - tan to purple, fine to coarse, with shell fragments.		SP		
66		08/24	0	CLAY - grey and red mottled firm, plastic.		CL		
71		24/24	0	CLAY - grey, lenses of purple and orange very fine sand, firm, very plastic.				
76		08/24	< 1	SAND - light tan, fine, poorly graded, trace silt, wet.		SP	3,5,4,3	
81		20/24	---	CLAY - light tan, low plasticity, sharp contact at 74 ft. to SAND, moderate reddish brown, fine to medium, poorly graded.		CL/SP	1,1,2,4	
		18/24	---	SAND - yellowish orange, fine to some medium, poorly graded, wet.		SP	11,22,24,27	

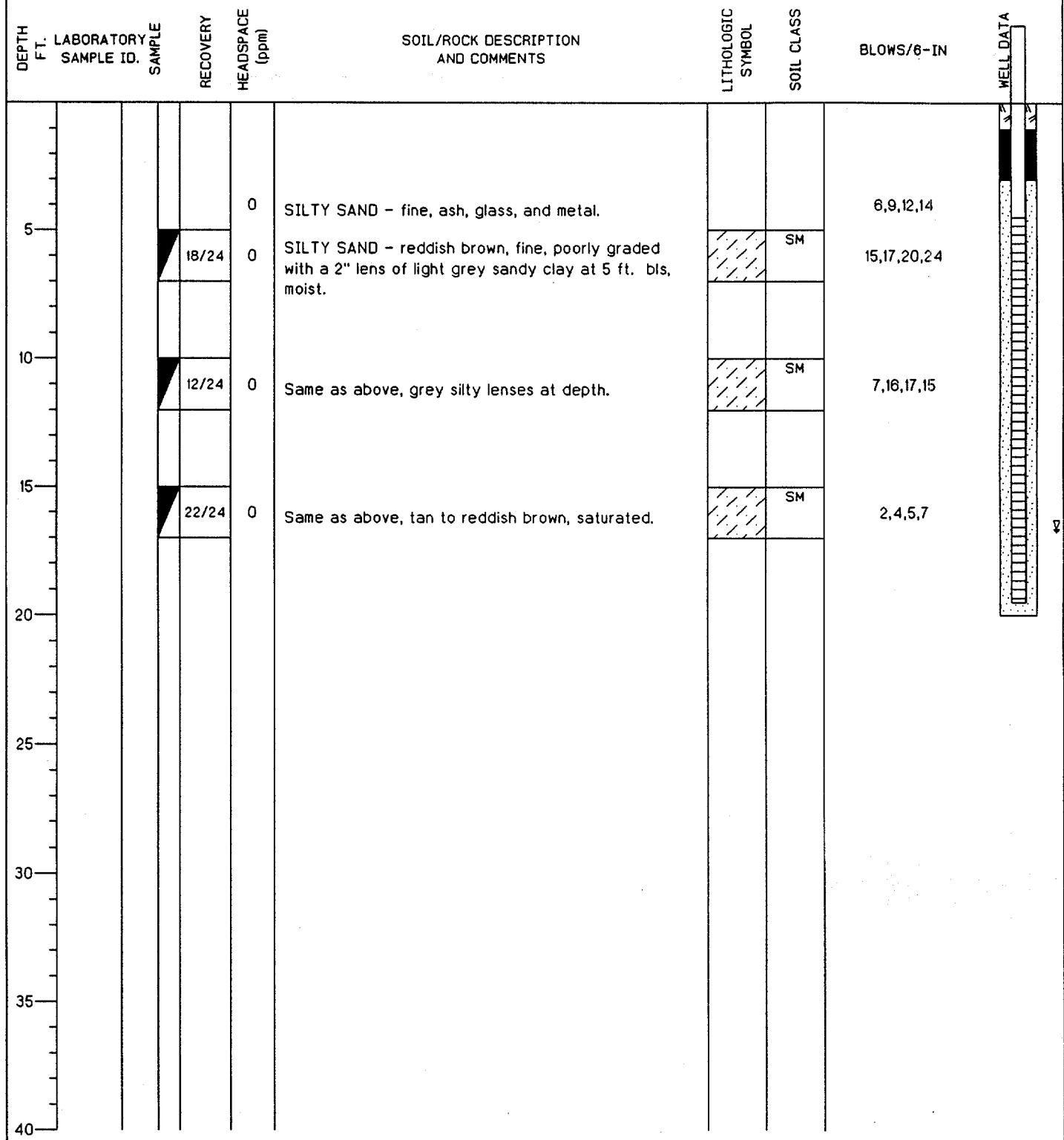
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-4D	BORING NO. N/A
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/02/93	COMPLTD: 02/18/93
METHOD: MUD ROT.	CASE SIZE: 6" & 2"	SCREEN INT.: 109-119 FT	PROTECTION LEVEL: D
TOC ELEV.: 52.95 FT.	MONITOR INST.: OVA	TOT DPTH: 121FT.	DPTH TO 14.16 FT.
LOGGED BY: M. Alvarez	WELL DEVELOPMENT DATE:	SITE: 16 - Wastewater Pit.	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-4II	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/04/93	COMPLTD: 02/05/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 50-60	PROTECTION LEVEL: D
TOC ELEV.: 53.06 FT.	MONITOR INST.: OVA	TOT DPTH: 60.5FT.	DPTH TO ∇ 14.19 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 16 - S.W. Landfill	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-16-4S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 02/03/93	COMPLTD: 02/04/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 5-20 FT	PROTECTION LEVEL: D
TOC ELEV.: 54.92 FT.	MONITOR INST.: OVA	TOT DPTH: 21FT.	DPHT TO ↓ 16.66 FT.
LOGGED BY: N. Haglin	WELL DEVELOPMENT DATE:		SITE: 16 - Open Disposal/Burn Area

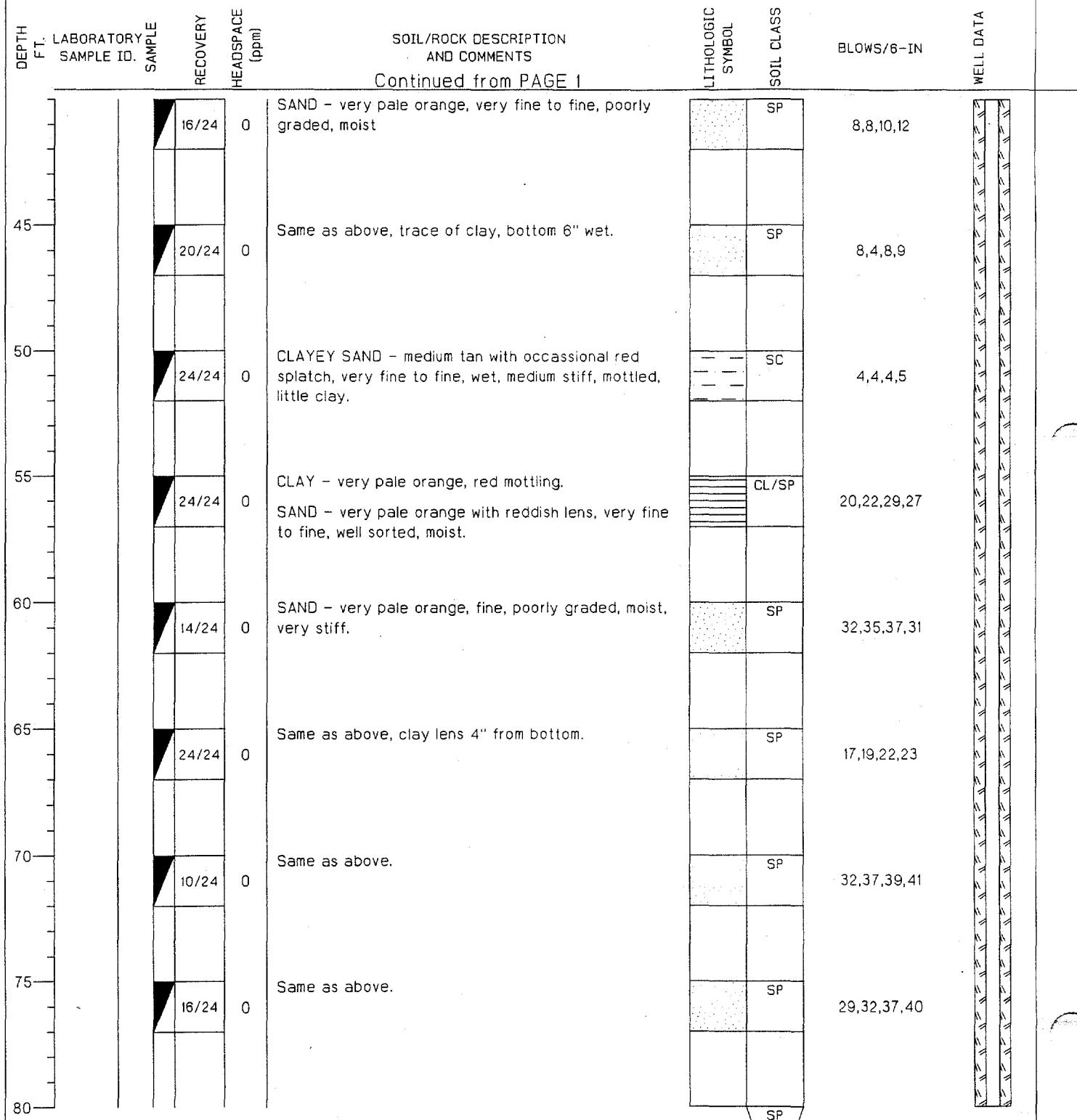


TITLE: NAVAL AIR STATION WHITING FIELD			LOG of WELL: WHF-16-5			BORING NO.			
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 7/27/93			COMPLTD: 7/27/93			
METHOD: HSA		CASE SIZE: 2"		SCREEN INT.: 0-10 FT		PROTECTION LEVEL: D			
TOC ELEV.: FT.		MONITOR INST.: OVA		TOT DPTH: 10FT.		DPTH TO 1.2 FT.			
LOGGED BY: S. Consalvi		WELL DEVELOPMENT DATE:				SITE: 16 Flood plain			
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SAMPLES WERE NOT TAKEN DURING INSTALLATION OF THIS WELL. IT IS LOCATED IN THE FLOOD PLAIN AND WAS INSTALLED BY HAND.					██████████
10									
15									
20									
25									
30									
35									

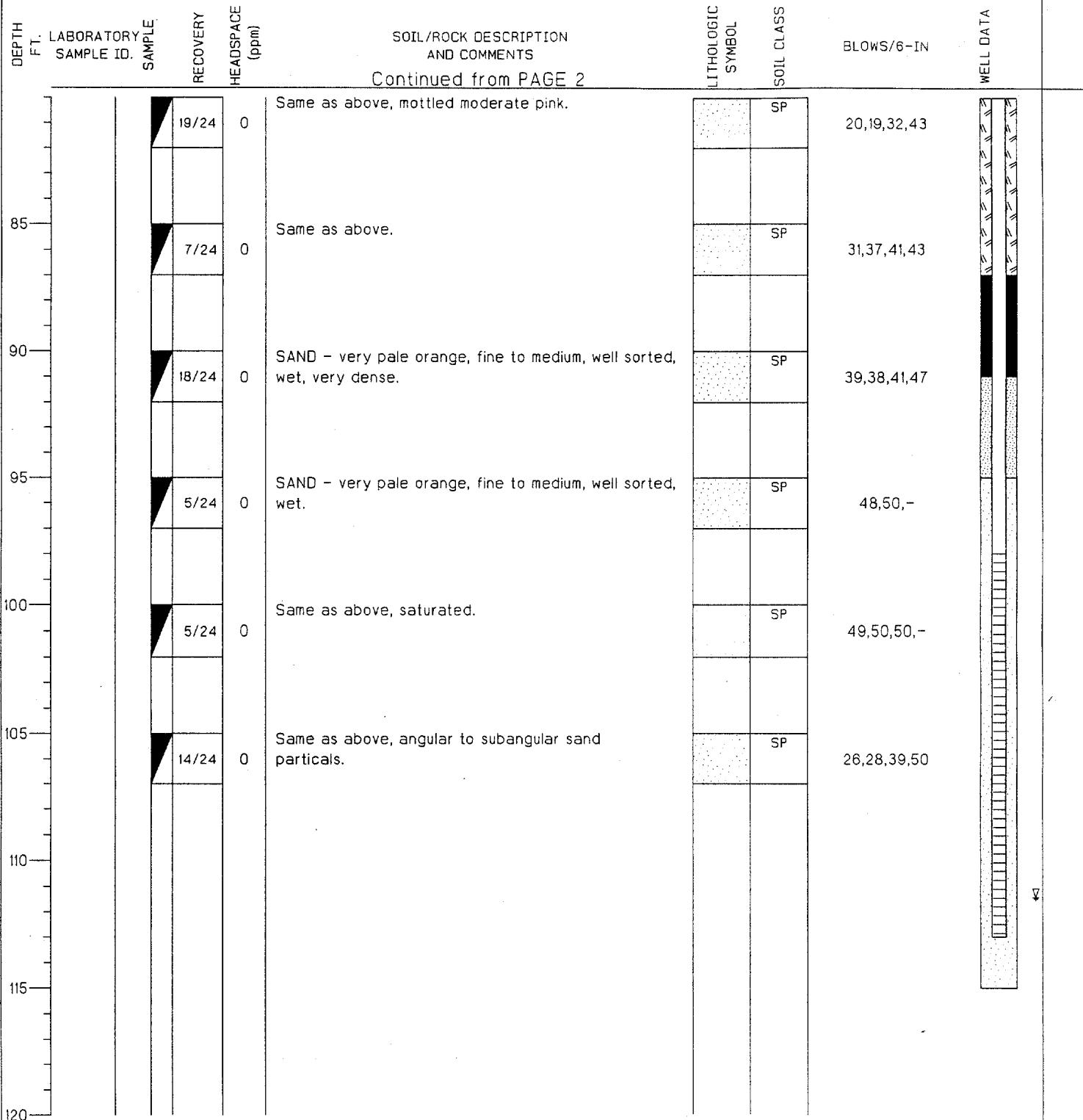
TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-17-1S	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 7/16/93	COMPLTD: 7/27/93				
METHOD: MUD ROTARY	CASE SIZE: 6"/2"		SCREEN INT.: 98-113 FT	PROTECTION LEVEL: D				
TOC ELEV.: 195.49 FT.	MONITOR INST.: OVA		TOT DPTH: 115FT.	DPTH TO 111.45 FT.				
LOGGED BY: N. Roka/G. Walker	WELL DEVELOPMENT DATE:			SITE: 17 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0.2	GRAVELLY SILT - red, firm to soft, moist.	0 0 0	GM	4,9,5,6	
10			0.3	SAND - red, fine, poorly graded, medium dense, moist.	SP		4,6,5,6	
15			BKG	SAND - light tan, fine to medium, poorly graded, medium dense, slightly moist, subrounded.	SP		7,10,11,18	
20			BKG	SAND - red, fine to medium, poorly graded, moderately dense to dense, subangular to angular.	SP		11,19,21,27	
25			0.2	SAND - whitish green to pink, very fine to fine, poorly graded, dense, dry.	SP		14,19,27,33	
30			0.1	SAND - pinkish tan, very fine to medium, poorly graded, dense, moist.	SP		11,23,24,26	
35			BKG	CLAY - gray to purple, vat, very plastic, soft.	CH		3,4,5,9	
40			0.3	CLAYEY SAND - purple, loose, soft, moist. SAND - very fine to fine, poorly graded, medium dense, damp.	SP		9,10,10,12	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-IS	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/16/93	COMPLTD: 7/27/93
METHOD: MUD ROTARY	CASE SIZE: 6"/2"	SCREEN INT.: 98-113 FT	PROTECTION LEVEL: D
TOC ELEV.: 195.49 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DPHT TO 111.45 FT.

LOGGED BY: N. Roka/G. Walker WELL DEVELOPMENT DATE: SITE: 17 - Fire Training

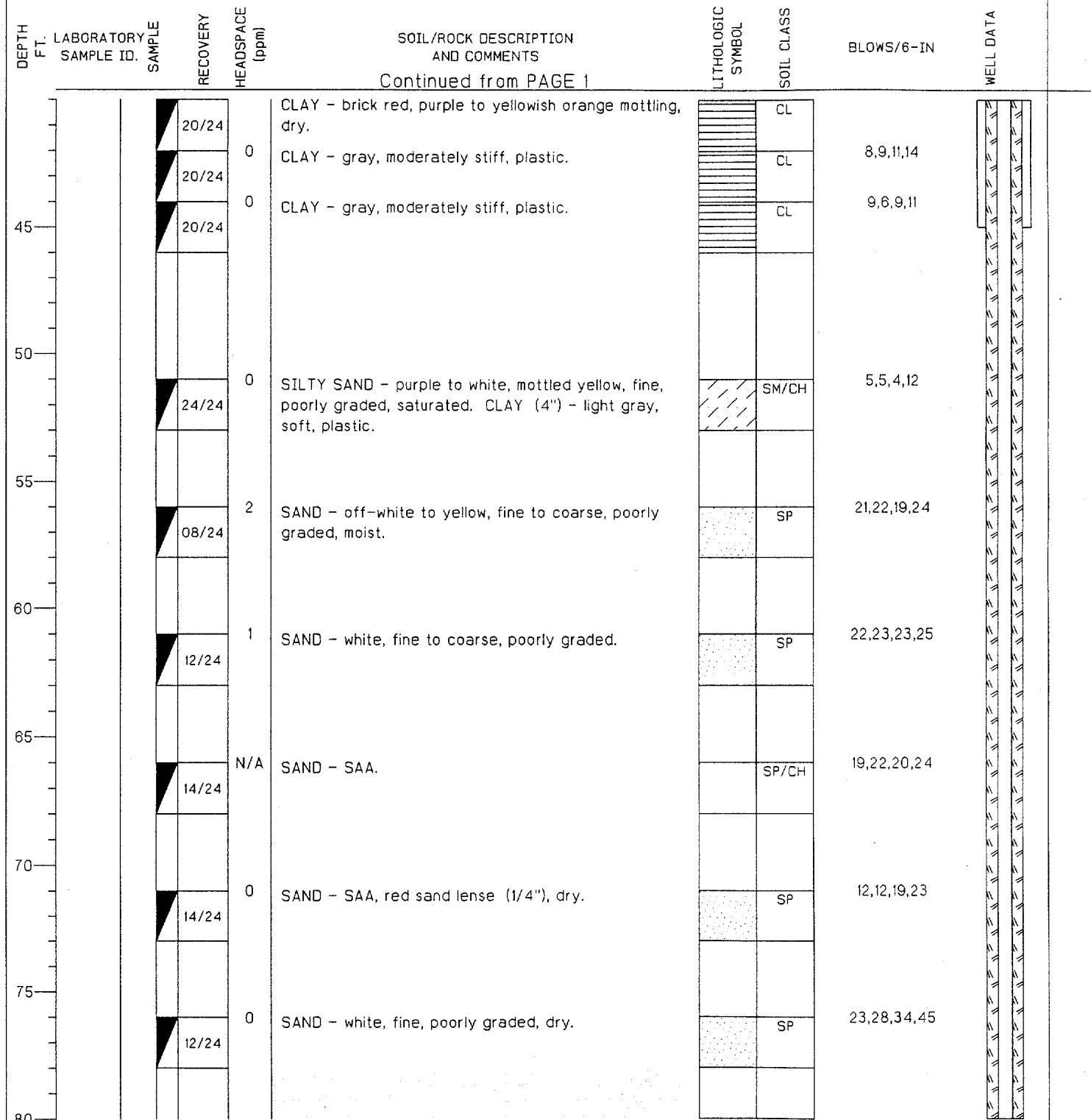


TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-1S	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/16/93	COMPLTD: 7/27/93
METHOD: MUD ROTARY	CASE SIZE: 6"/2"	SCREEN INT.: 98-113 FT	PROTECTION LEVEL: D
TOC ELEV.: 195.49 FT.	MONITOR INST.: OVA	TOT DPTH: 115FT.	DEPTH TO 111.45 FT.
LOGGED BY: N. Roka/G. Walker	WELL DEVELOPMENT DATE:		SITE: 17 - Fire Training

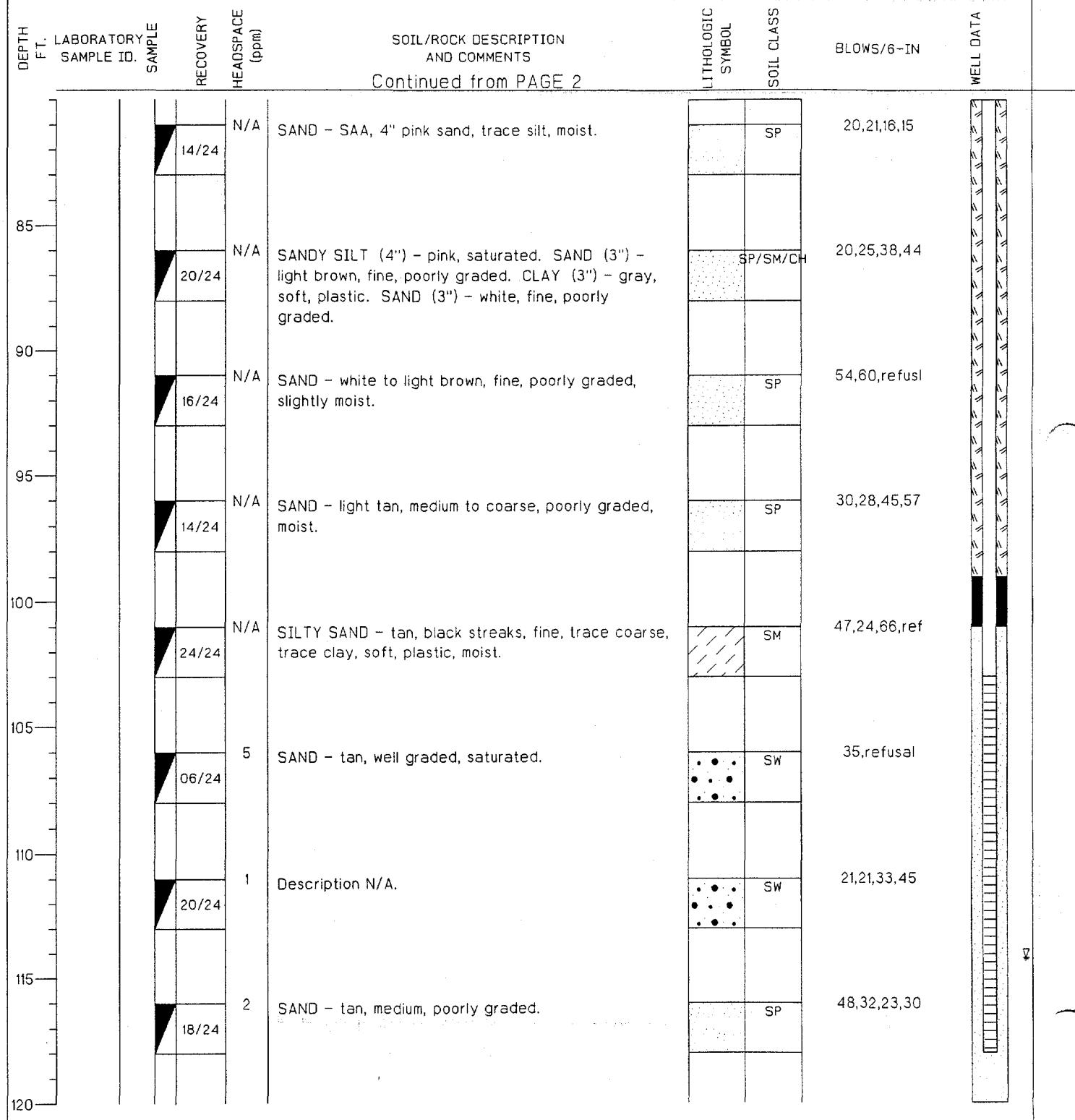


TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-17-2	BORING NO.	
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA		
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 2/23/93	COMPLTD: 3/07/93	
METHOD: HSA	CASE SIZE: 2 in.			SCREEN INT.: 104-119 FT	PROTECTION LEVEL: D	
TOC ELEV.: 197.47 FT.	MONITOR INST.: OVA			TOT DPTH: 120FT.	DPTH TO § 114.21 FT.	
LOGGED BY: G. Kanchibhatla, R. Nelson	WELL DEVELOPMENT DATE:			SITE: 17 - Fire Training		
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS		LITHOLOGIC SYMBOL	
SAMPLE					SITE CLASS	
					BLOWS/6-IN	
					WELL DATA	
5		0	SANDY CLAY - brick red, soft, slightly moist.		SC	2,3,3,4
10	20/24	0	SANDY CLAY - SAA.		SC	4,7,8,10
15	00/24	0	SAND - brick red, very fine to fine, poorly graded, loose, dry.		SP	2,4,5,5
20	14/24	0	SAND - SAA, white to light red.		SP	3,5,8,14
25	12/24	0	SAND - white to light red, fine to medium, some coarse, well graded, dry.		SW	6,12,10,8
30	14/24	0	SANDY CLAY - purple to yellow to white bands, soft, trace silt, moist.		SC	5,4,6,8
35	18/24	0	SANDY CLAY - SAA, moist.		SC	2,3,4,4
40	20/24	0			CL	3,4,6,8

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/23/93	COMPLTD: 3/07/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 104-119 FT	PROTECTION LEVEL: D
TOC ELEV.: 197.47 FT.	MONITOR INST.: OVA	TOT DPTH: 120FT.	DPTH TO 114.21 FT.
LOGGED BY: G. Kanchibhatla, R. Nelson		WELL DEVELOPMENT DATE:	



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/23/93	COMPLTD: 3/07/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 104-119 FT	PROTECTION LEVEL: D
TOC ELEV.: 197.47 FT.	MONITOR INST.: OVA	TOT DPTH: 120FT.	DEPTH TO 114.21 FT.
LOGGED BY: G. Kanchibhatla, R. Nelson	WELL DEVELOPMENT DATE:		SITE: 17 - Fire Training

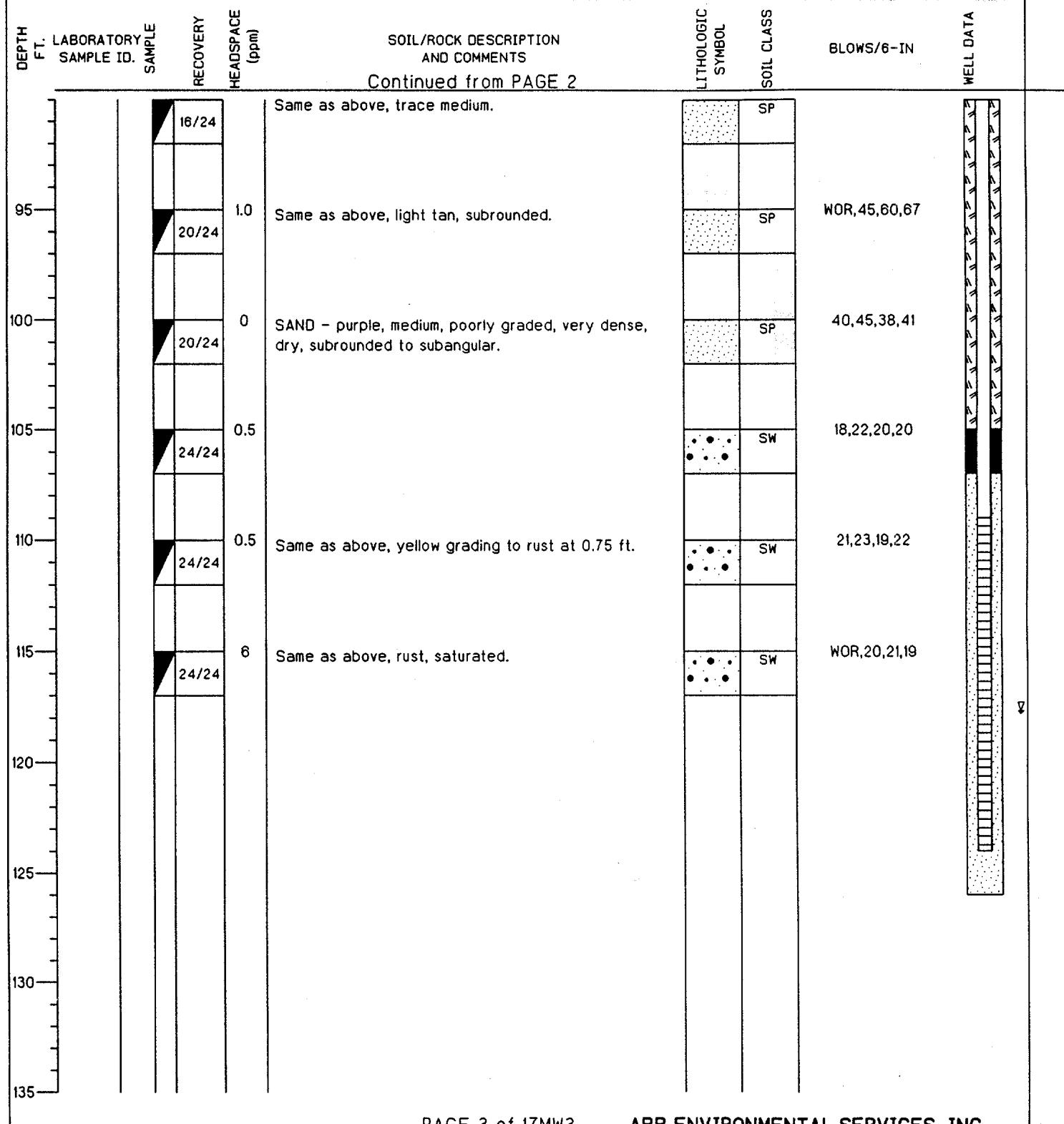


TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-17-3		BORING NO. N/A			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 7/13/93		COMPLTD: 7/14/93				
METHOD: HSA		CASE SIZE: 2 in.		SCREEN INT.: 109-124 FT		PROTECTION LEVEL: D			
TOC ELEV.: 201.62 FT.		MONITOR INST.: OVA		TOT DPTH: 125FT.		DPTH TO V 117.7 FT.			
LOGGED BY: N. Roka		WELL DEVELOPMENT DATE:			SITE: 17 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5				SILTY SAND - orange, fine, poorly graded, loose, dry, subrounded.		SM	3,3,4,4		
10				CLAYEY SAND - red, fine, some silt, poorly graded, medium dense, dry, orange, mottling.		SC	3,7,8,11		
15				SILTY SAND - red, fine to medium, poorly graded, medium dense, dry, subrounded to subangular.		SM	7,11,7,9		
20				SAND - light orange, fine to medium, poorly graded, medium dense.		SP	4,8,14,20		
25				SAND - light yellow, fine to medium, poorly graded, medium dense, dry.		SP	7,10,14,16		
30									
35				SILTY SAND - light pink, trace clay, poorly graded, medium dense, moist, subrounded.		SM	15,11,10,11		
40				SAND - light pink, very fine to medium, poorly graded, medium dense, dry, subrounded.		SP	5,9,16,18		
45						CL	10,8,6,9		

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-3	BORING NO. N/A
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/13/93	COMPLTD: 7/14/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 109-124 FT	PROTECTION LEVEL: D
TOC ELEV.: 201.62 FT.	MONITOR INST.: OVA	TOT DPTH: 125FT.	DPTH TO ↓ 117.7 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 17 - Fire Training

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1							
	20/24		SANDY CLAY - light pink, fine to medium sand, moderately loose, slightly moist, low plasticity.	CL			
50	20/24	0.5	CLAY - gray, moderate plasticity, soft, slightly moist.	SP		5,15,13,20	
			SAND - white to orange, fine, poorly graded, dense, dry, subrounded.				
55	24/24	0	Same as above, very fine to fine.	SP		WOR,13,20,27	
60	24/24	1.0	Same as above, fine to medium.	SP		16,19,17,29	
65	24/24	0.5	SAND - fine to medium, poorly graded, medium dense, dry, subrounded.	SP		12,12,18,22	
			SILTY SAND - pinkish gray, medium dense.				
70	20/24	1.0	SAND - very fine to fine, poorly graded medium dense, dry, subrounded.	SP		14,18,15,18	
			SAND - pinkish gray to white, fine to medium, poorly graded, dense, dry, subangular.				
75	16/24	0.5	SAND - white to orange, very fine to fine, poorly graded, dense, dry, subrounded to subangular.	SP		16,27,34,37	
80	22/24	0.5	SAND - gray, very fine to fine, poorly graded, dry, subrounded.	SP		17,19,16,21	
85	18/24	1.0	SAND - light tan to pink, fine, poorly graded, very dense, dry, subangular.	SP		14,22,35,26	
90		0.5		SP		12,17,30,44	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-17-3	BORING NO. N/A
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/13/93	COMPLTD: 7/14/93
METHOD: HSA	CASE SIZE: 2 in.	SCREEN INT.: 109-124 FT	PROTECTION LEVEL: D
TOC ELEV.: 201.62 FT.	MONITOR INST.: OVA	TOT DPTH: 125FT.	DPTH TO ↓ 117.7 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 17 - Fire Training

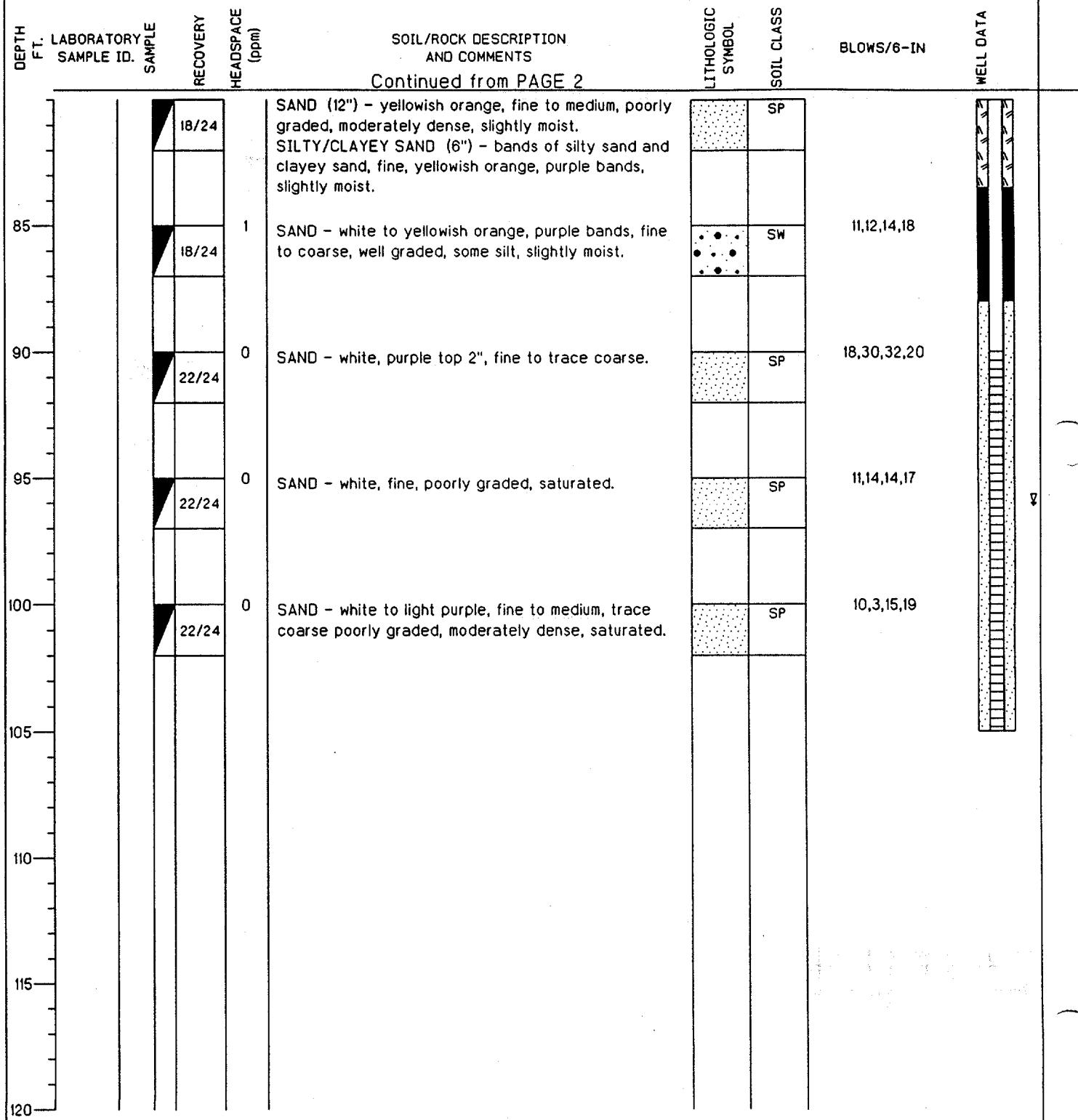


TITLE: NAVAL AIR STATION WHITING FIELD				LOG of WELL: WHF-18-2	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 2/21/93		COMPLTD: 2/22/93			
METHOD: MUD ROTARY	CASE SIZE: 2 in.		SCREEN INT.: 90-105 FT		PROTECTION LEVEL: D			
TOC ELEV.: 164.84 FT.	MONITOR INST.: OVA		TOT DPTH: 107FT.		DPTH TO 96.02 FT.			
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:			SITE: 18 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0	SAND - tan to dark tan, very fine to fine, poorly graded, loose, dry.		SP	2,3,2,3	
10			0	SAND - SAA, yellowish orange.		SP	3,4,5,8	
15			0	SAND - SAA, white w/ yellowish orange bands.		SP	5,10,11,14	
20			0	SAND - yellowish orange, fine to medium, well graded, moderately dense, trace silt, dry.	• • • • • •	SW	7,10,10,11	
25			0	SAND (4") - yellowish orange, fine, poorly graded, loose, trace silt, dry. SANDY CLAY (2") - light purple, dry. SAND (12") - white, very fine to fine, poorly graded, loose, dry.		SP	7,9,10,11	
30			0	SAND - white to light yellow and yellowish orange bands, very fine, trace coarse, poorly graded, loose, dry.		SP	5,6,8,10	
35			0	SAND - yellowish orange to tan, fine, poorly graded, loose, dry.		SP	6,11,11,15	
40			0			CL/SP	2,8,12,12	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-18-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/21/93	COMPLTD: 2/22/93
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 90-105 FT	PROTECTION LEVEL: D
TOC ELEV.: 164.84 FT.	MONITOR INST.: OVA	TOT DPTH: 107FT.	DPTH TO ↓ 96.02 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 18 - Fire Training

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1								
		20/24		CLAY (6") - gray, pink mottling. SAND (14") - yellowish orange, fine to coarse, poorly graded, dry.	CL/SP			
45		20/24	0	SAND - white, fine to coarse, poorly graded, loose, dry.	SP		12,18,10,26	
50		22/24	0	SAND - white, very fine, trace coarse, poorly graded, loose, dry.	SP		11,17,20,22	
55		22/24	0	SAND - white, fine, trace coarse, poorly graded, loose, dry.	SP		24,20,32,44	
60		22/24	0	SAND - SAA, trace very fine to fine, black chips.	SP		16,26,31,36	
65		22/24	0	SAND - SAA, trace medium.	SP		16,22,31,34	
70		22/24	0	SAND - SAA.	SP		14,20,25,26	
75		22/24	1	SAND - very fine to fine, poorly graded, loose, dry.	SP		17,25,35,37	
80			0		SP		10,15,15,18	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-18-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 2/21/93	COMPLTD: 2/22/93
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 90-105 FT	PROTECTION LEVEL: D
TOC ELEV.: 164.84 FT.	MONITOR INST.: OVA	TOT DPTH: 107FT.	DPTH TO ↓ 96.02 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 18 - Fire Training	

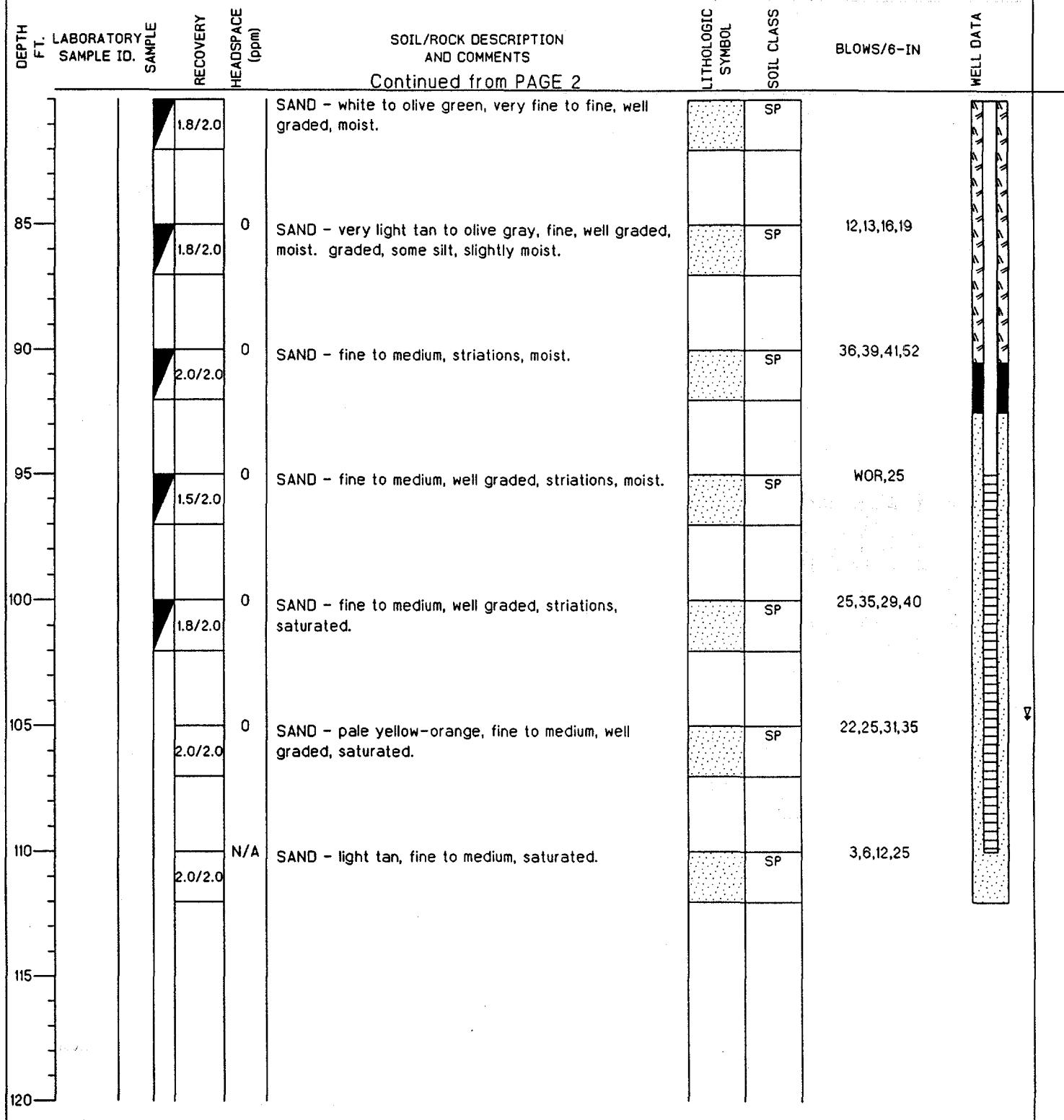


TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-18-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93	COMPLTD: 6/27/93
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D
TOC ELEV.: 176.21 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.	DPTH TO V 104.58 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 18 - Fire Training

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			0	SAND - pale orange-brown to orange-brown, very fine to medium, poorly sorted.		SP	2,2,3,2	
10			0	SAND - orange brown, fine, well graded, 2" sandy clay lense, slightly plastic.		SP	4,4,8,7	
15			0	SAND - white, very fine, well graded, very fine black phosphatic grains scattered.		SP	8,14,12,7	
20			0	SAND - SAA, multiple striations of white, orange-brown, tan, & very pale purple.		SP	7,8,15,15	
25			0	SAND - very pale purple to pale moderate red, medium, well graded, mottled, slightly moist.		SP	9,14,12,16	
30			0	SAND - SAA, multiple striations of white, orange-brown, very pale orange, tan, very light tan.		SP	19,16,23,24	
35			0	SAND - fine to medium, well graded, striations of orange-brown, white, pale moderate red, light tan, very pale orange, & very pale purple, moist.		SP	16,19,21,23	
40			0			SP	8,9,16,14	

TITLE: NAVAL AIR STATION WHITING FIELD			LOG of WELL: WHF-18-3		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93		COMPLTD: 6/27/93				
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 95-110 FT		PROTECTION LEVEL: D				
TOC ELEV.: 176.21 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.		DPTH TO ↓ 104.58 FT.				
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:			SITE: 18 - Fire Training				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS Continued from PAGE 1	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
45			0	SAND - white, fine, poorly sorted, moist.		SP		
50			0	SAND - SAA, fine to medium, trace coarse, striations.		SP	12,12,16,15	
55		N/A	0	SAND - dark moderate red to pale gray, very fine to fine, trace clay & silt, moist.		SP	9,8,8,11	
60			0	CLAYEY SAND - dark moderate red, pale gray, mottled, moist. CLAY - pale gray, slight dark moderate red mottling, plastic, trace sand. SILTY SAND - tan to white, very fine to fine, striations.		SC	11,9,16,18	
65			0	SAND - white, very fine to fine, well graded, moist.		SP	12,14,21,23	
70			0	SAND - light tan to white, very fine to fine, well graded.		SP	16,25,36,50	
75			0	SAND - white, fine to medium, trace coarse, striations, dense.		SP	28,36,47,45	
80			0	SAND - white, very fine to fine, well graded, striations.		SP	18,30,28,30	
							14,16,20,21	

TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-18-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93	COMPLTD: 6/27/93
METHOD: MUD ROTARY	CASE SIZE: 2 in.	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D
TOC ELEV.: 176.21 FT.	MONITOR INST.: OVA	TOT DPTH: 112FT.	DPTH TO V 104.58 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 18 - Fire Training



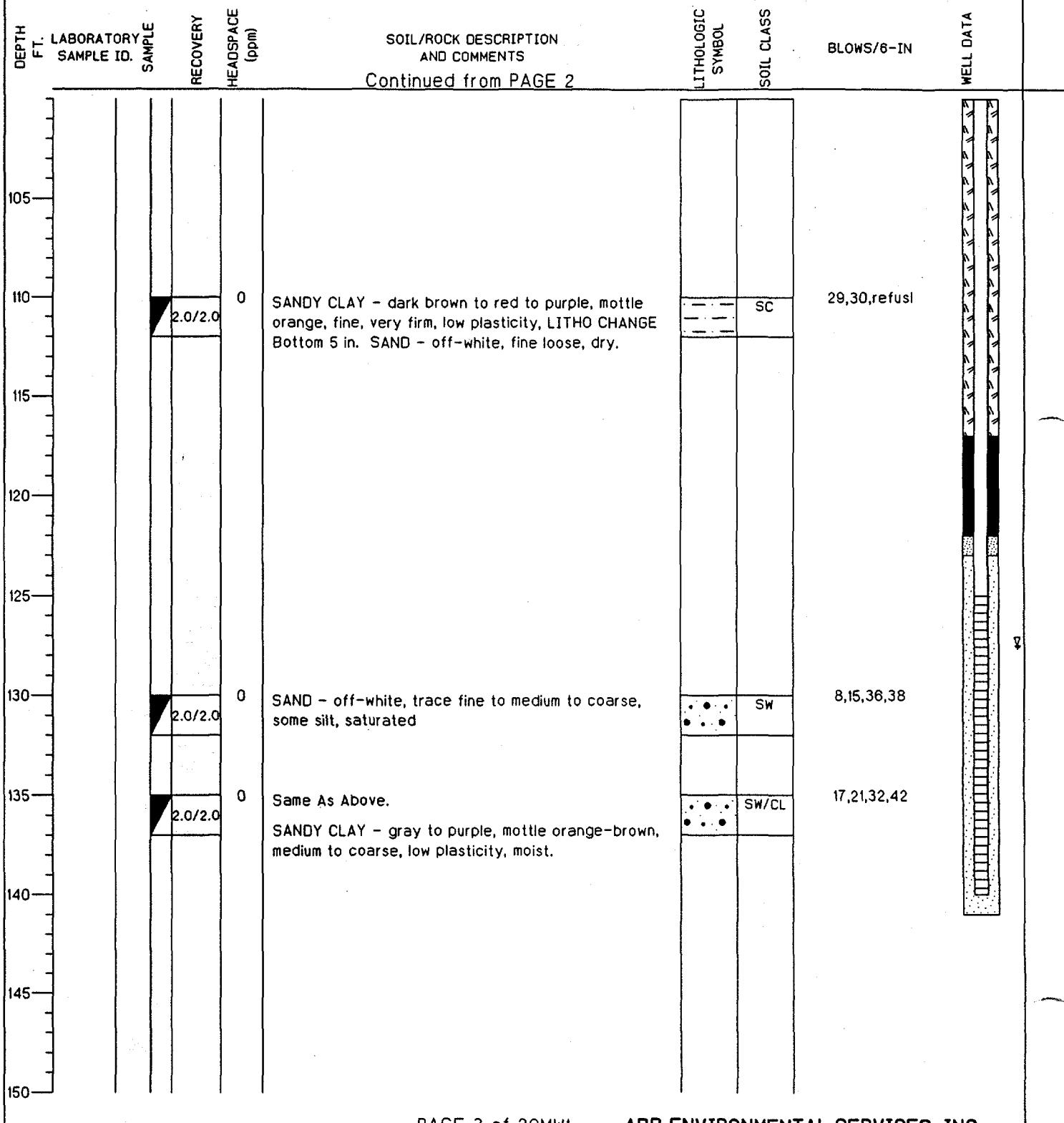
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/08/93	COMPLTD: 6/08/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 125-140 FT.	PROTECTION LEVEL: D
TOC ELEV.: 193.95 FT.	MONITOR INST.: OVA	TOT DPTH: 141FT.	DPTH TO 127.52 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 29 - HOBBY SHOP	

DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				SEE WHF-29-2 FOR ADDITIONAL LITHOLOGICAL DESCRIPTIONS.				
10								
15								
20								
25								
30								
35								
40								
45								
50								

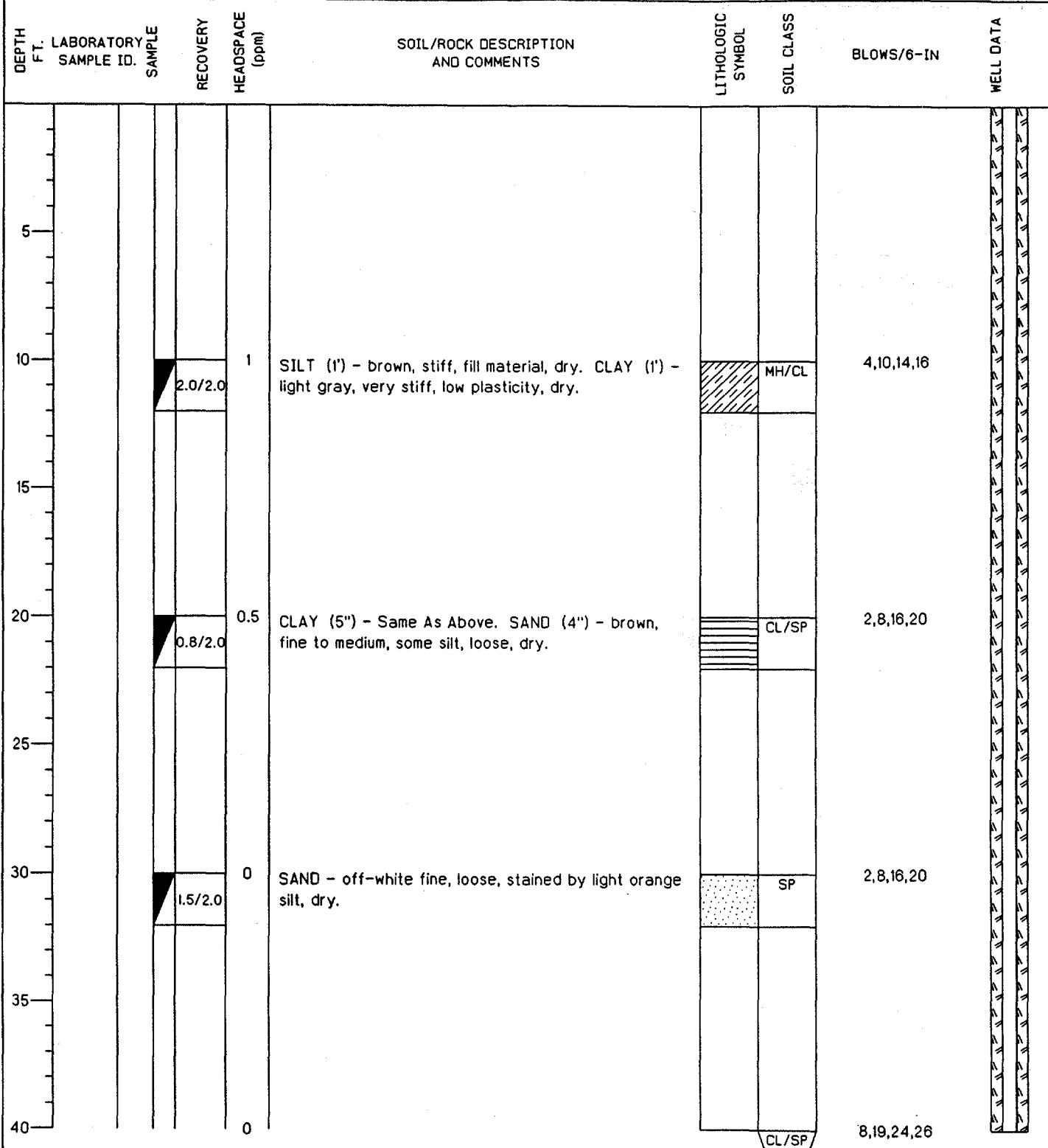
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/08/93	COMPLTD: 6/08/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 125-140 FT.	PROTECTION LEVEL: D
TOC ELEV.: 193.95 FT.	MONITOR INST.: OVA	TOT DPTH: 141FT.	DPTH TO ↓ 127.52 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 29 - HOBBY SHOP	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS <i>Continued from PAGE 1</i>	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								

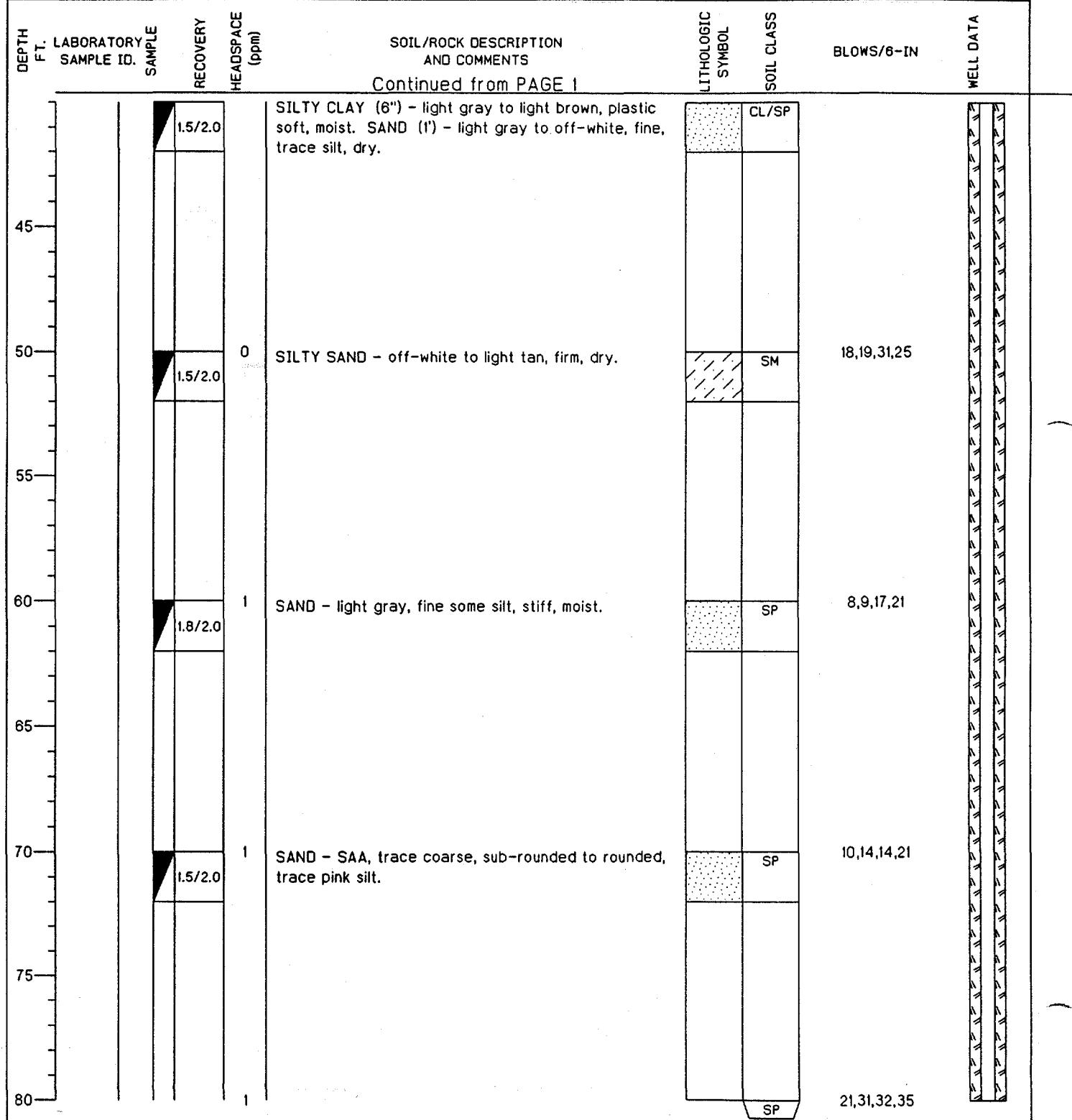
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/08/93	COMPLTD: 6/08/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 125-140 FT.	PROTECTION LEVEL: D
TOC ELEV.: 193.95 FT.	MONITOR INST.: OVA	TOT DPTH: 141FT.	DPTH TO ↓ 127.52 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29 - HOBBY SHOP



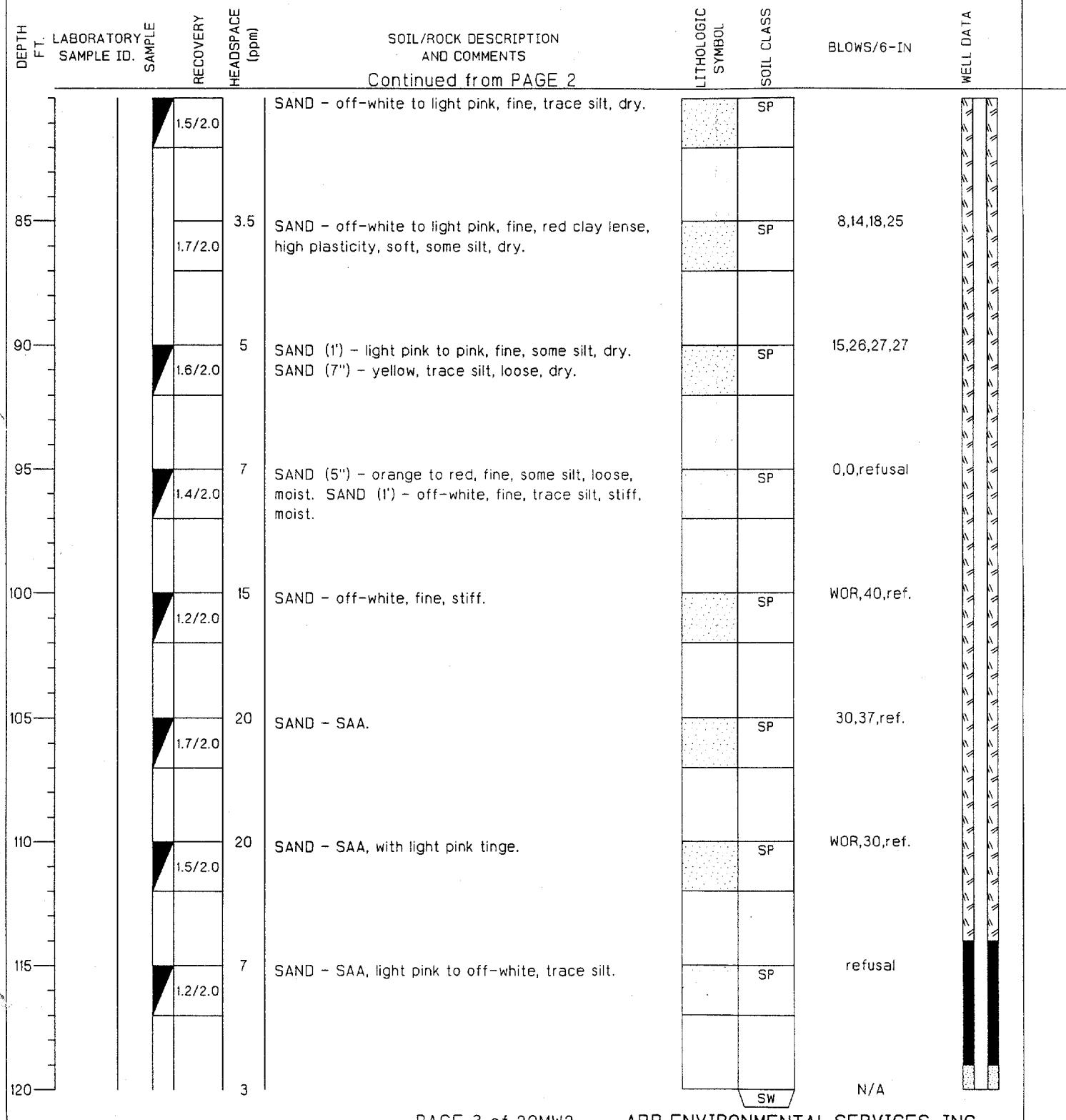
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/13/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 122-137 FT.	PROTECTION LEVEL: B,D
TOC ELEV: 191.87 FT.	MONITOR INST.: OVA	TOT DPTH: 139FT.	DPTH TO 126.54 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/13/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 122-137 FT.	PROTECTION LEVEL: B,D
TOC ELEV: 191.87 FT.	MONITOR INST.: OVA	TOT DPTH: 139FT.	DPTH TO ↓ 126.54 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/13/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 122-137 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 191.87 FT.	MONITOR INST.: OVA	TOT DPTH: 139FT.	DPTH TO 126.54 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 29	

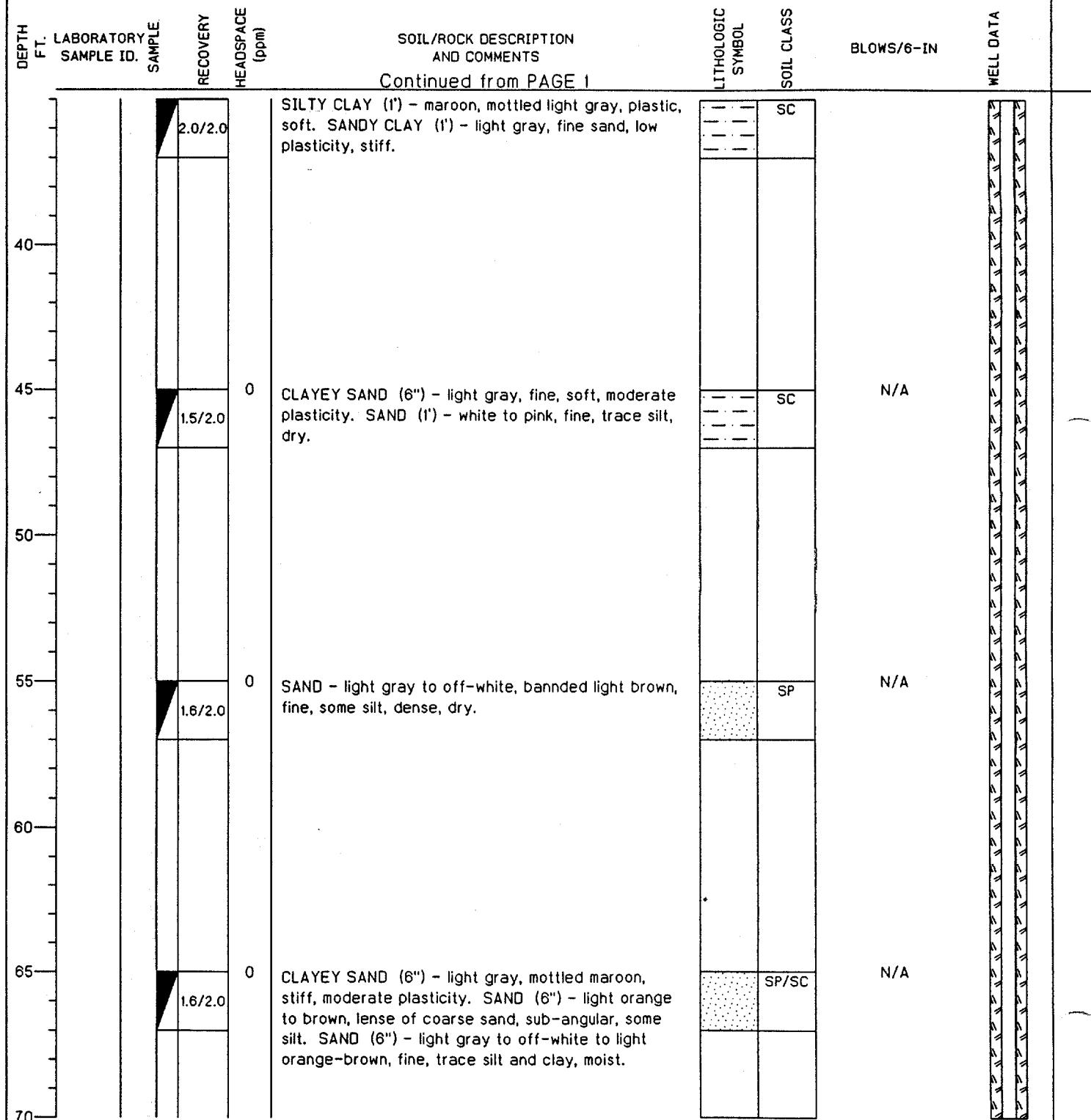


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/12/93	COMPLTD: 6/13/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 122-137 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 191.87 FT.	MONITOR INST.: OVA	TOT DPTH: 139FT.	DPTH TO ↓ 126.54 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 29	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 3								
120		1.2/2.0		SAND (7") - purple to red, fine to coarse, well graded. SAND (7") - off-white, dense, trace silt.	● ● ●	SW		
125		1.0/2.0		SAND - off-white, fine to coarse, well graded, dense, trace silt, sub-angular.	● ● ●	SW	N/A	
130		2.0/2.0		SAND - light tan, fine to medium, firm, saturated.	██████████	SP	N/A	
135		2.0/2.0		SAND - SAA, 5" silty clay lense, mottled purple, stiff, plastic.	|||||||	CL	N/A	
140								
145								
150								
155								
160								

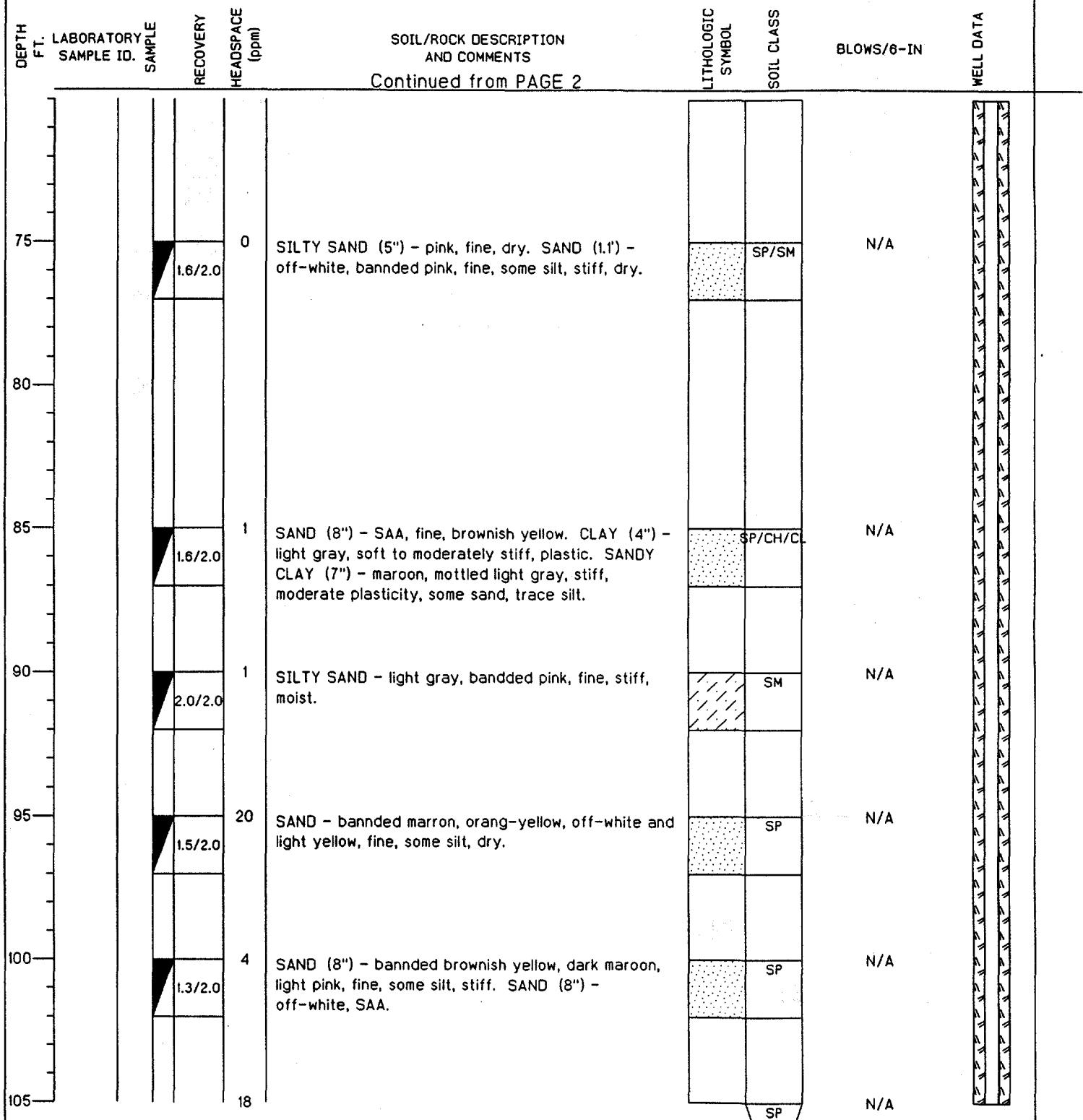
TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-29-3	BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/11/93		COMPLTD: 6/11/93				
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 124-139 FT.		PROTECTION LEVEL: B,D				
TOC ELEV.: 194.39 FT.	MONITOR INST.: OVA	TOT DPTH: 140FT.		DPTH TO † 128.73 FT.				
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE: N/A			SITE:				
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		0.6/2.0	1	SILT - yellow orange, moderately dense, some fine sand (<5%), dry,	ML			N/A
10								
15		1.0/2.0	0	SILT (6") - Same As Above, Bottom (6") - SANDY CLAY - light gray to dark off-white, plastic, stiff, dry.	ML/CL			N/A
20								
25		1.1/2.0	0	SANDY CLAY (2") - Same As Above.ace silt, loose, dry. SILTY SAND (2") - dark reddish-brown, stiff, brittle, dry. SAND (2") - orange to red, fine, some silt. SAND (2") - SAA, light gray. SAND (2") - SAA, light gray, banded pink. SAND (3") - SAA, golden yellow.	SC/SP			N/A
30								
35			0		SC			N/A

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/11/93	COMPLTD: 6/11/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 124-139 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 194.39 FT.	MONITOR INST.: OVA	TOT DPTH: 140FT.	DPTH TO ↓ 128.73 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE: N/A		SITE:

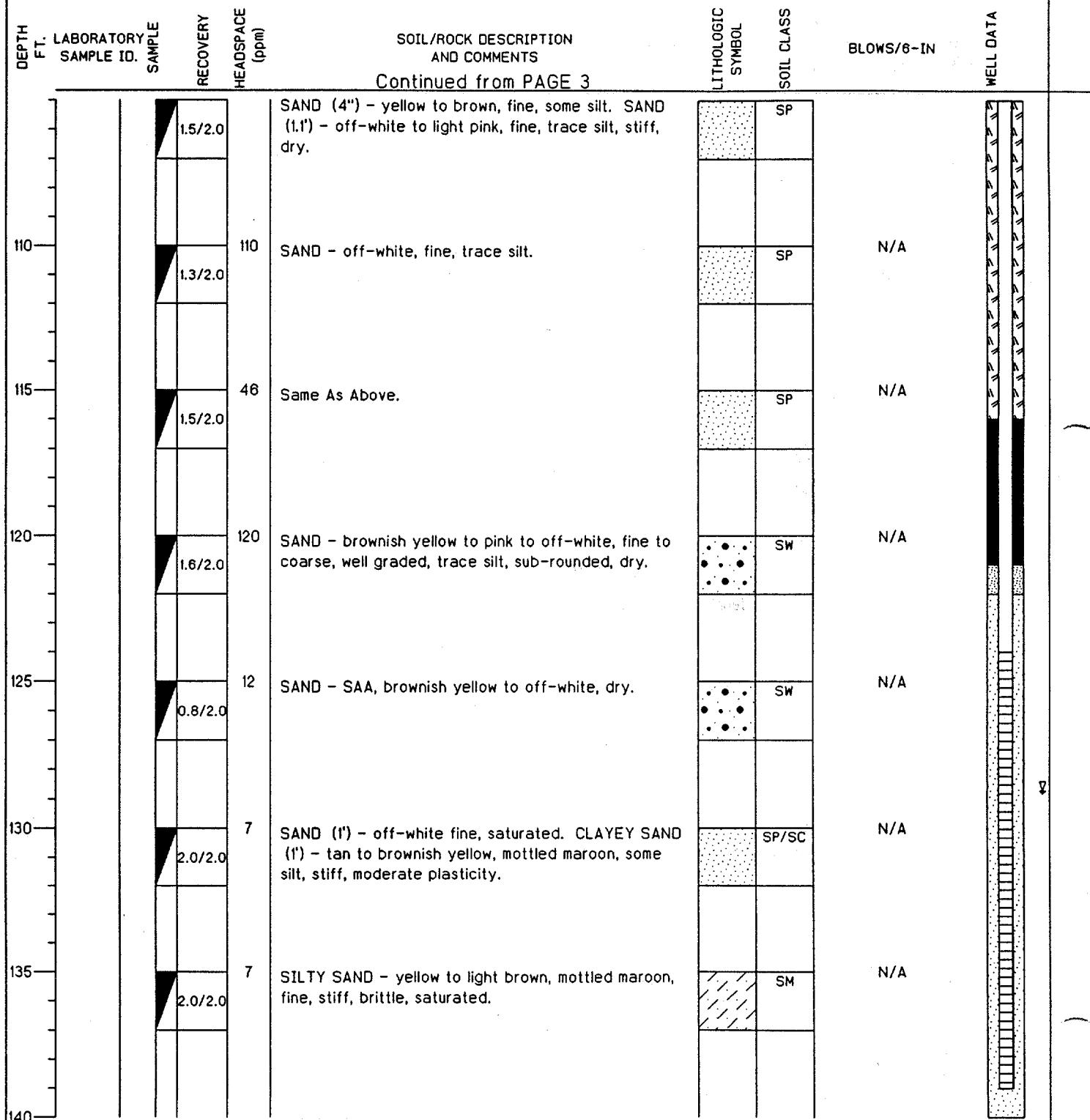


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/11/93	COMPLTD: 6/11/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 124-139 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 194.39 FT.	MONITOR INST.: OVA	TOT DPTH: 140FT.	DPTH TO ↓ 128.73 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE: N/A		SITE:

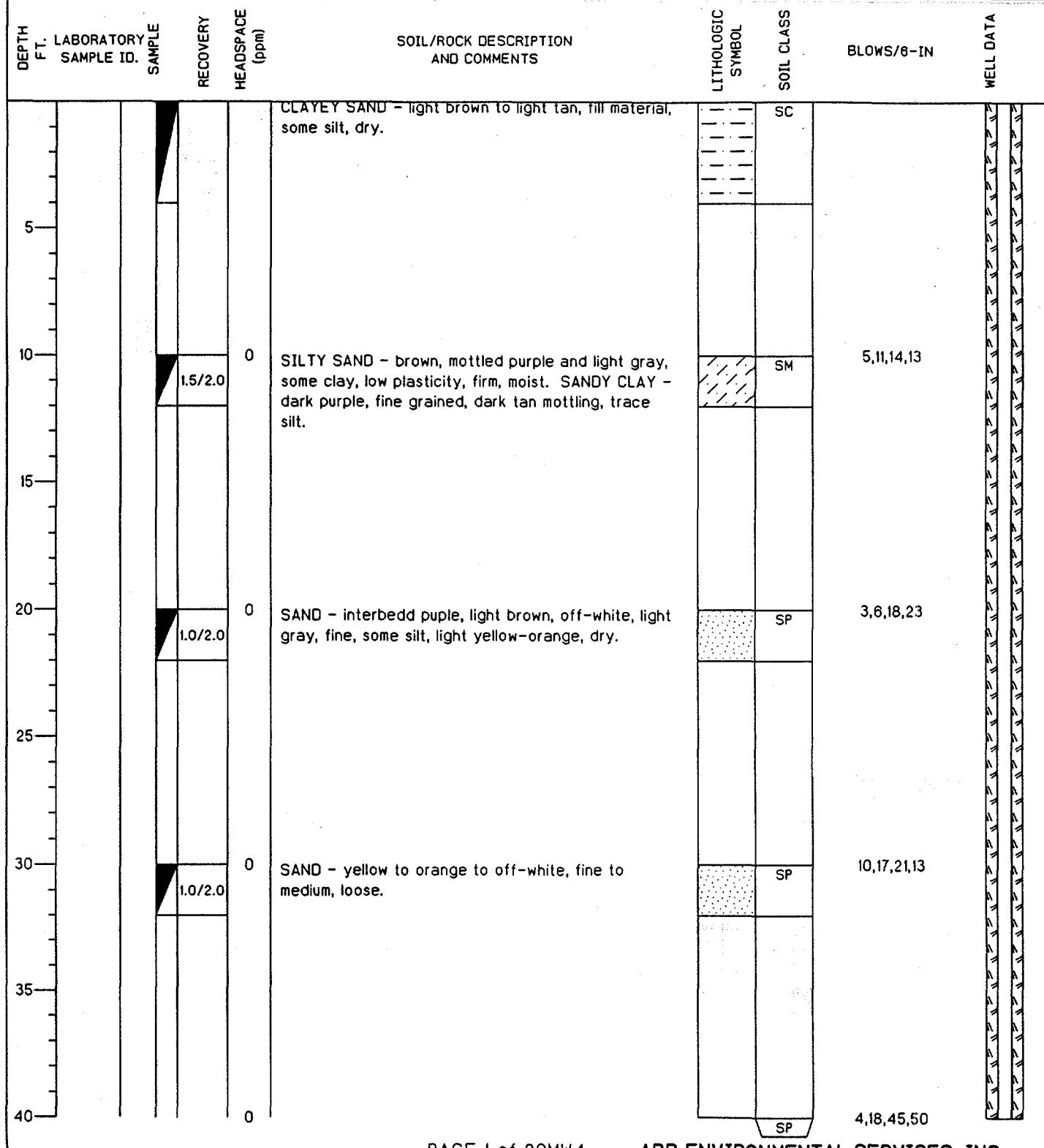
**SOIL/ROCK DESCRIPTION
AND COMMENTS**



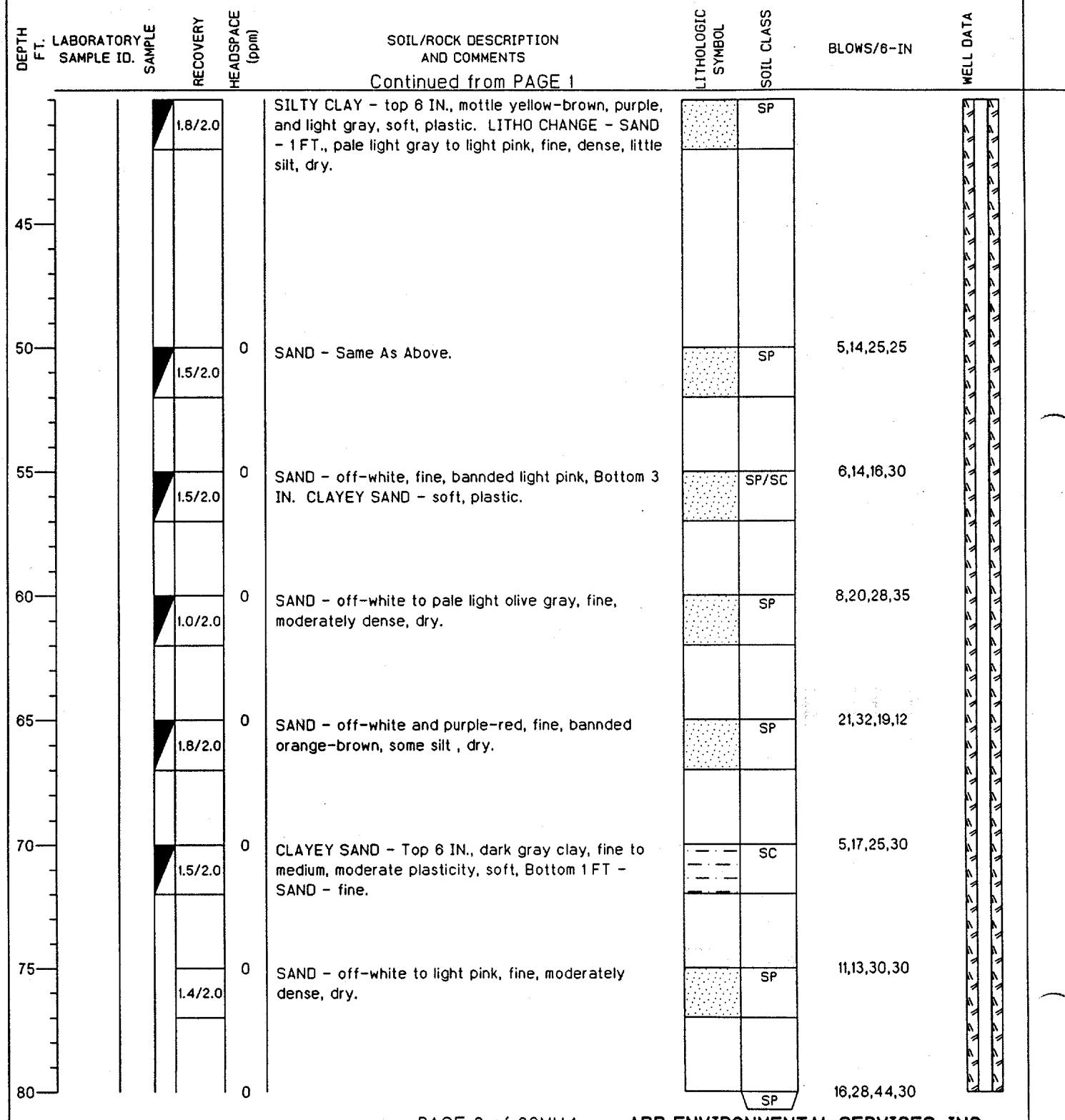
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/11/93	COMPLTD: 6/11/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 124-139 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 194.39 FT.	MONITOR INST.: OVA	TOT DPTH: 140FT.	DPTH TO 128.73 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE: N/A		SITE:



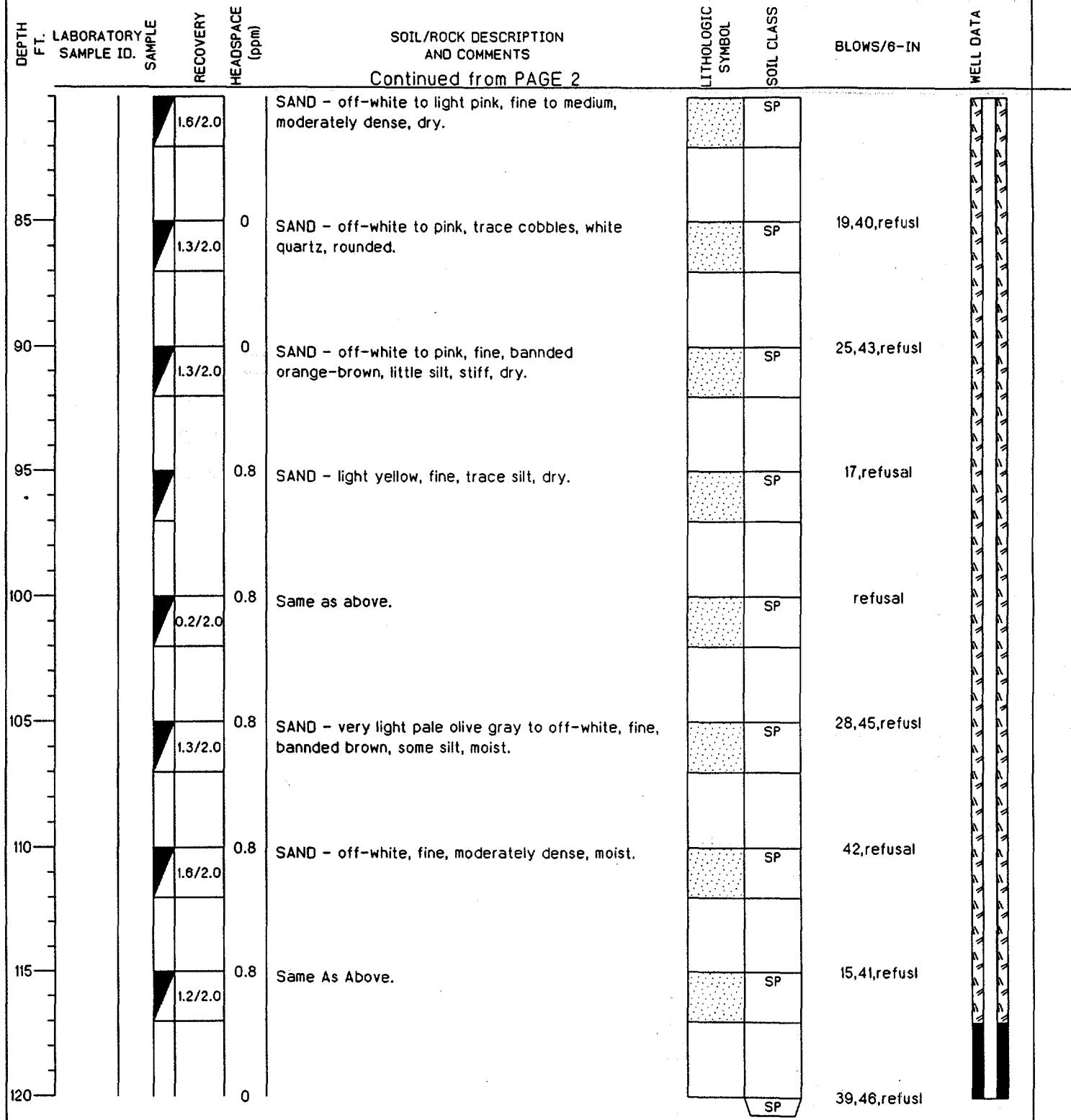
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/10/93	COMPLTD: 6/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 124-139 FT	PROTECTION LEVEL: B, D
TOC ELEV: 196.21 FT.	MONITOR INST.: FID	TOT DPTH: 142FT.	DPTH TO ↓ 129.96 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29



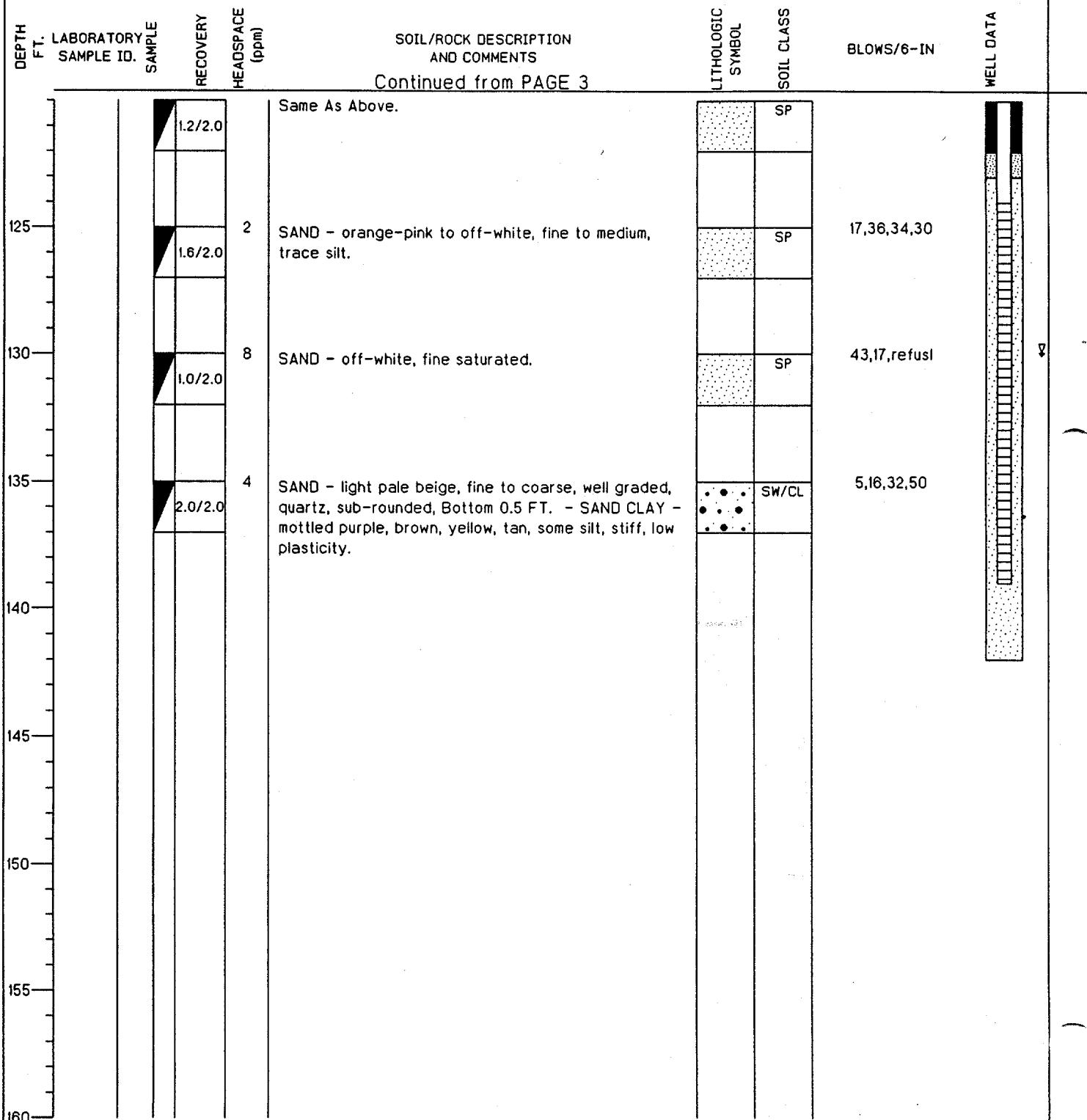
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/10/93	COMPLTD: 6/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 124-139 FT	PROTECTION LEVEL: B, D
TOC ELEV.: 196.21 FT.	MONITOR INST.: FID	TOT DPTH: 142FT.	DPTH TO ↓ 129.96 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/10/93	COMPLTD: 6/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 124-139 FT	PROTECTION LEVEL: B, D
TOC ELEV.: 196.21 FT.	MONITOR INST.: FID	TOT DPTH: 142FT.	DPTH TO ↓ 129.96 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29

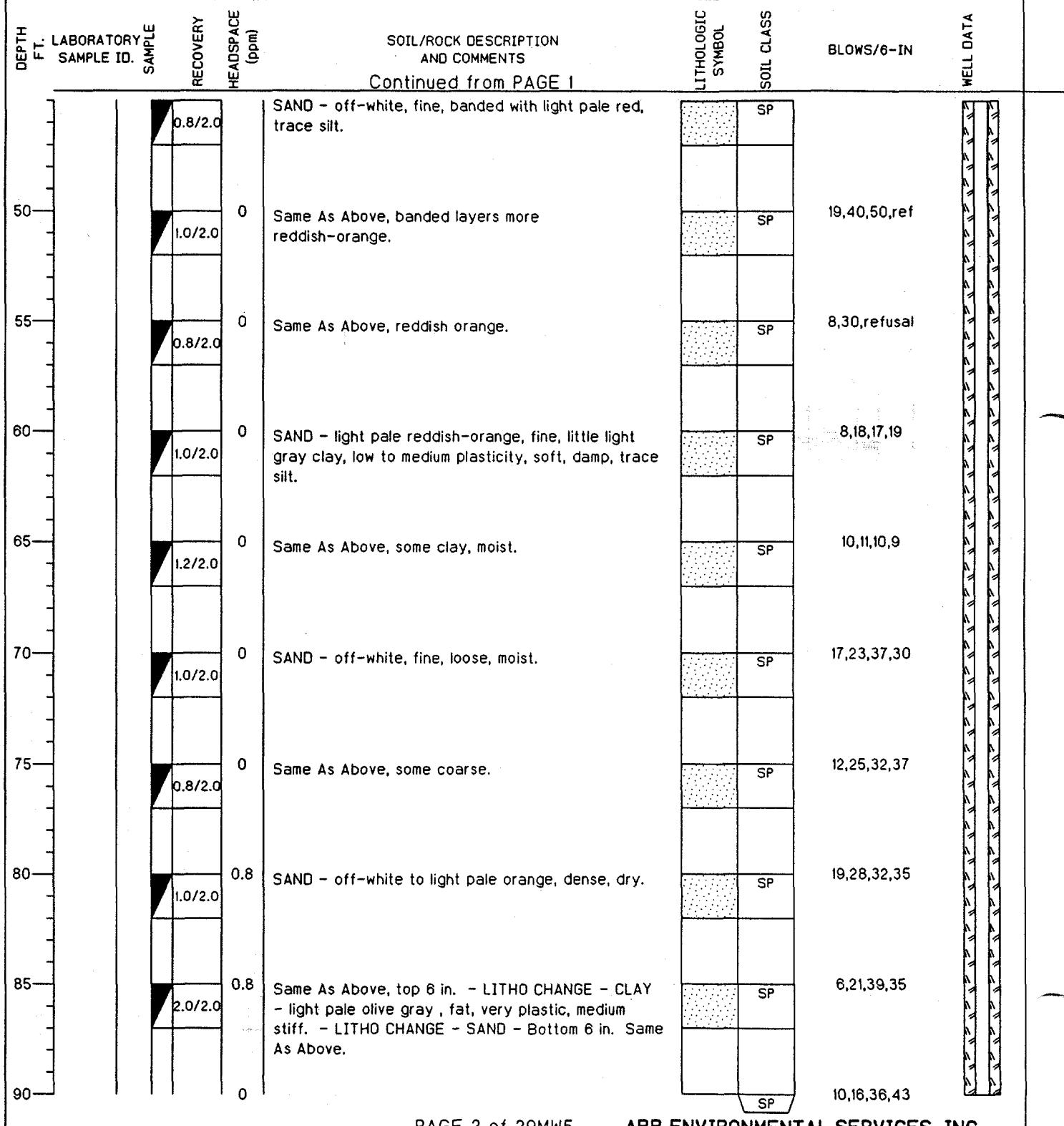


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/10/93	COMPLTD: 6/10/93
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 124-139 FT	PROTECTION LEVEL: B, D
TOC ELEV: 196.21 FT.	MONITOR INST.: FID	TOT DPTH: 142FT.	DPTH TO ↓ 129.96 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29

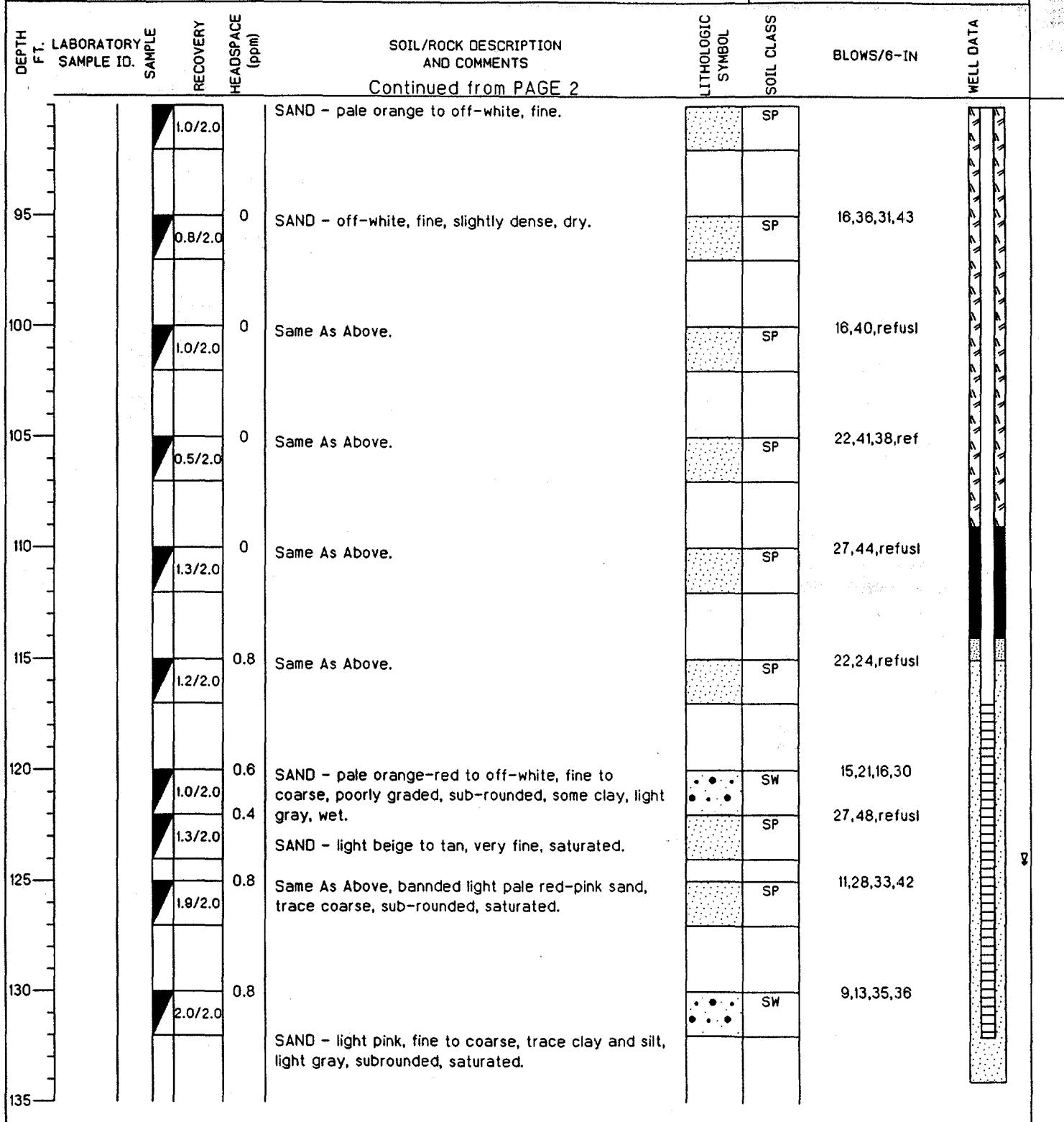


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-29-5		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 6/09/93		COMPLTD: 6/09/93				
METHOD: Hollow Stem Auger	CASE SIZE: 2"		SCREEN INT.: 117-132 FT.		PROTECTION LEVEL: D				
TOC ELEV.: 193.8 FT.	MONITOR INST.: OVA		TOT DPTH: 134FT.		DPTH TO ↓ 124.1 FT.				
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:				SITE: 29 - HOBBY SHOP				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5					CLAYEY SAND - tan to brown, fine, fill material, dry.	---	SC		
10			1.5/2.0	0	CLAYEY SAND - purple to light gray, fine sand, stiff, low plasticity, dry.	---	SC	5,8,14,19	
15			0.0/2.0		No Recovery.			3,7,10,16	
20			0.5/2.0	0	SAND - purple red to pale red, fine, trace silt, dry.	SP	SP	2,9,9,15	
25			1.0/2.0	0	SAND - off-white, fine, trace silt, loose, dry.	SP	SP	9,12,17,17	
30			1.5/2.0	0	Same As Above, trace medium sand, sub rounded, slightly dense.	SP	SP	6,6,13,18	
35			1.7/2.0	0	SAND - off-white to light pale red, very fine, some medium, trace silt, loose, dry.	SP	SP	9,15,18,19	
40			1.8/2.0	0	SAND - off-white to light pale gray, very fine, slightly dense, slightly moist.	SP	SP	7,10,15,18	
45				0				15,20,28,40	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/09/93	COMPLTD: 6/09/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 117-132 FT.	PROTECTION LEVEL: D
TOC ELEV.: 193.8 FT.	MONITOR INST.: OVA	TOT DPTH: 134FT.	DPTH TO ↓ 124.1 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29 - HOBBY SHOP



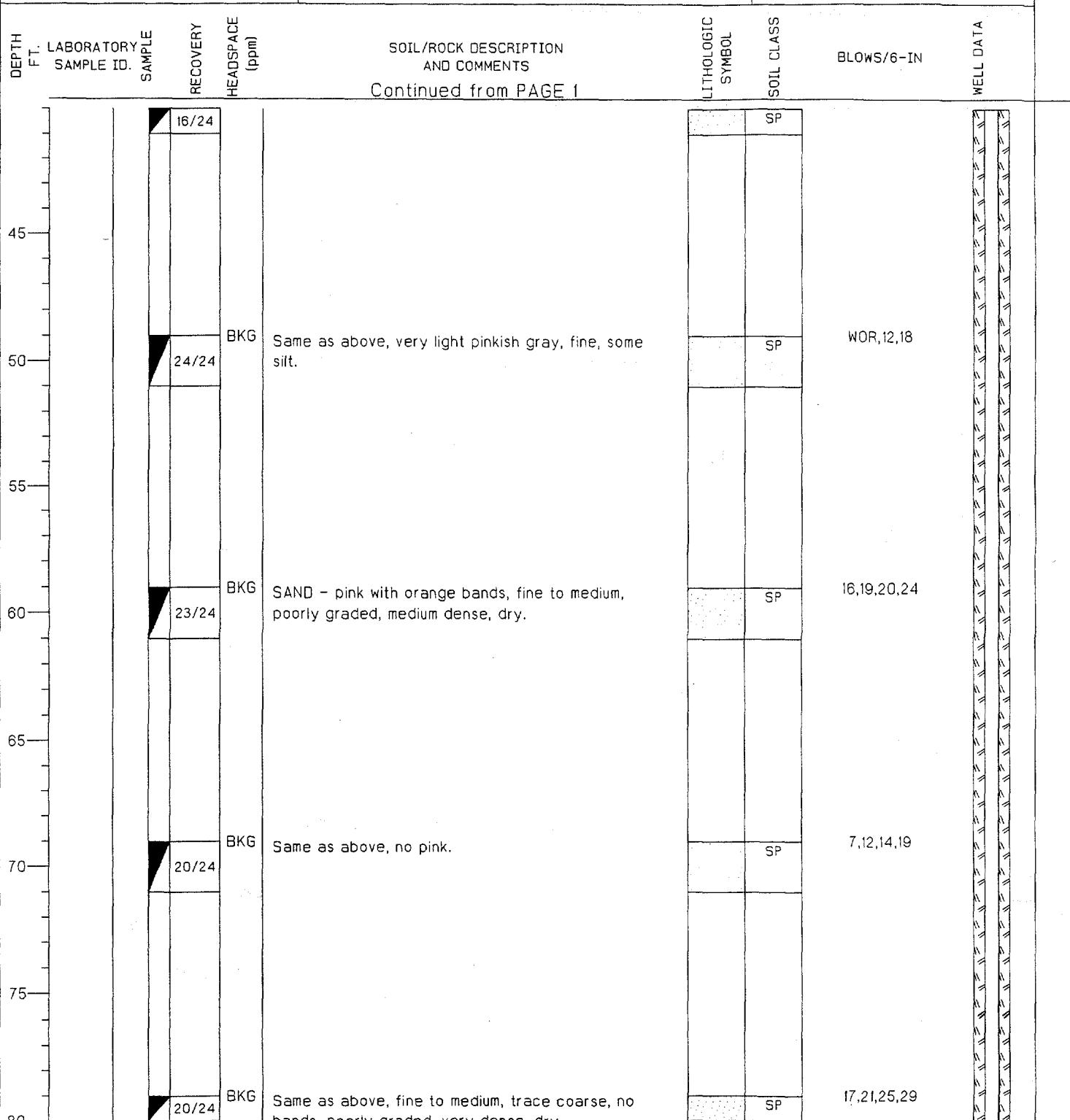
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-29-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/09/93	COMPLTD: 6/09/93
METHOD: Hollow Stem Auger	CASE SIZE: 2"	SCREEN INT.: 117-132 FT.	PROTECTION LEVEL: D
TOC ELEV.: 193.8 FT.	MONITOR INST.: OVA	TOT DPTH: 134FT.	DPTH TO ↓ 124.1 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 29 - HOBBY SHOP



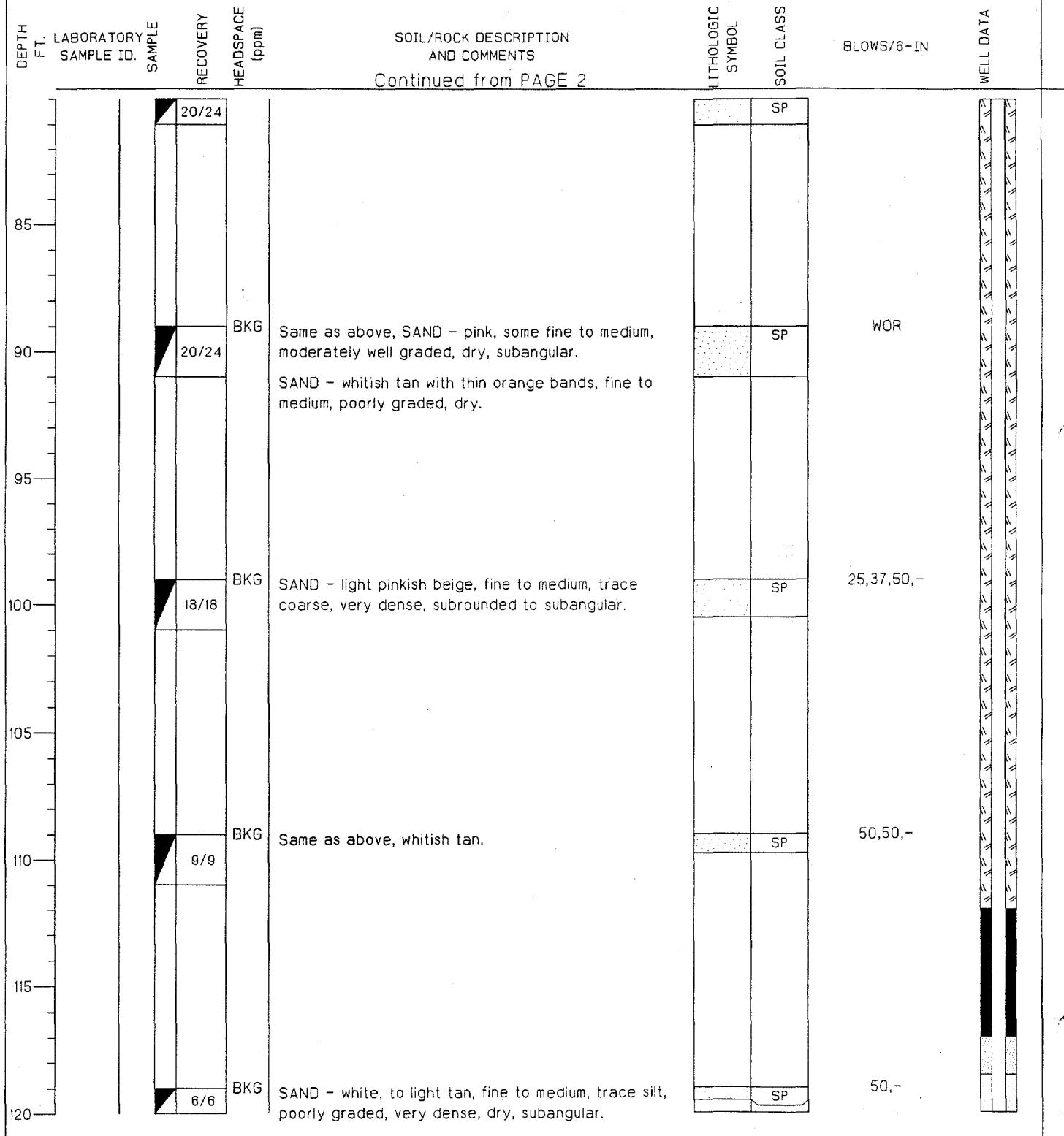
TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-30-3		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 6/16/93		COMPLTD: 6/16/93				
METHOD: HSA		CASE SIZE: 2"	SCREEN INT.: 120-135 FT		PROTECTION LEVEL: D				
TOC ELEV.: 179.29 FT.		MONITOR INST.: FID/OVA	TOT DPTH: 142FT.		DPTH TO ∇ 121.92 FT.				
LOGGED BY: N. Roka		WELL DEVELOPMENT DATE:			SITE: 30				
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5									
10									
10		22/24	BKG	SILTY CLAY - red to tan, Grade to CLAY - gray, firm, dry.	CL		2,4,6,8		
15									
20									
20		19/24	BKG	SAND - purple with red banding, fine to medium, trace coarse, moderately well graded, moderately dense, dry, subangular.	SP		4,10,15,17		
25									
30									
30		23/24	BKG	SAND - white, fine, to medium, poorly graded, medium dense, dry, subrounded to subangular.	SP		5,11,15,18		
35									
40									
40		16/24	BKG	Same as above, light pink to orange, fine, thin red bands,	SP		12,9,6,12		
CLAYEY SILT - pink to orange, fine to medium, fine sand, dense, dry.								ABB ENVIRONMENTAL SERVICES, INC.	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/16/93	COMPLTD: 6/16/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 120-135 FT	PROTECTION LEVEL: D
TOC ELEV.: 179.29 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 142FT.	DPTH TO 121.92 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 30

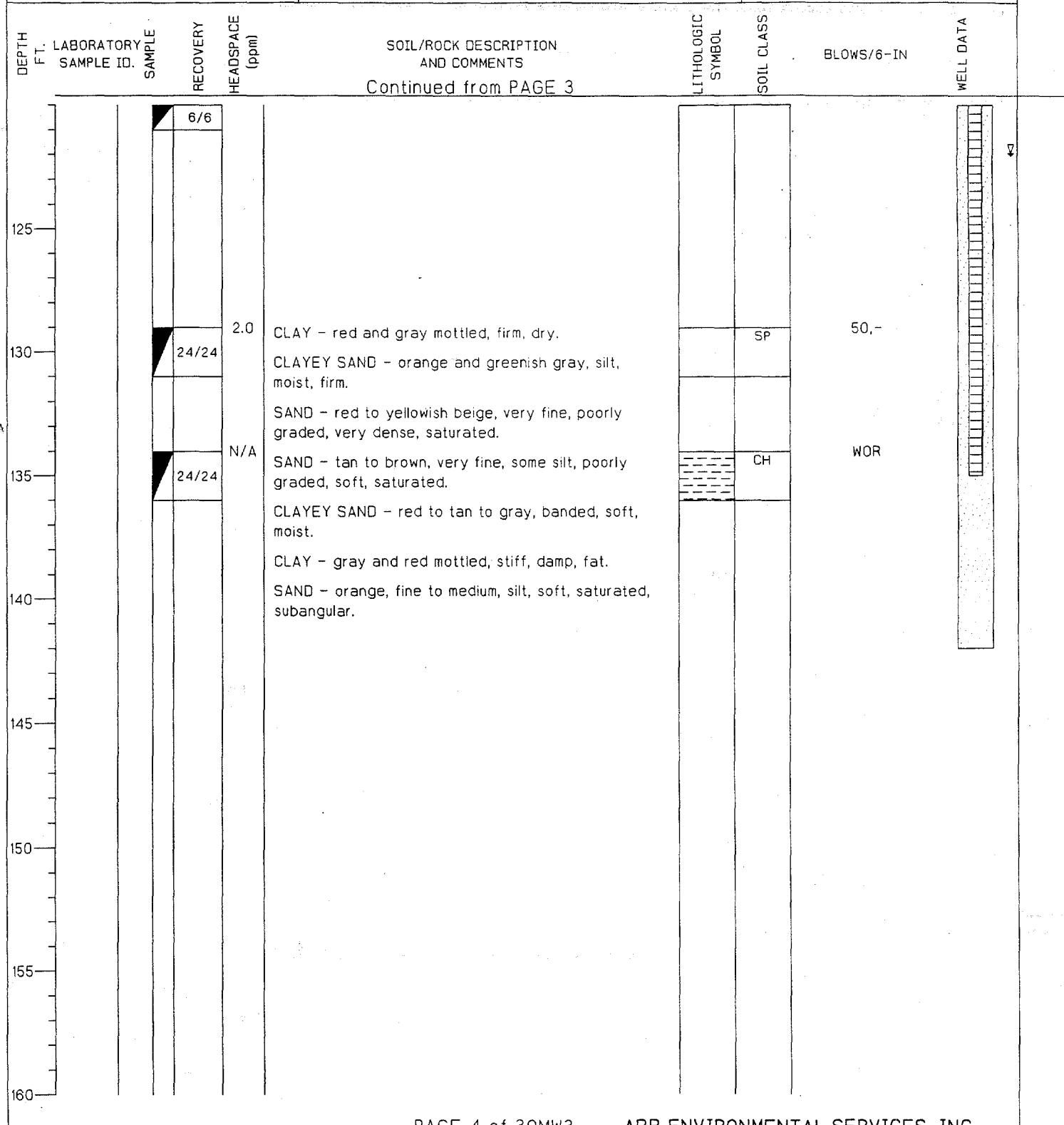
**SOIL/ROCK DESCRIPTION
AND COMMENTS**



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/16/93	COMPLTD: 6/16/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 120-135 FT	PROTECTION LEVEL: 0
TOC ELEV.: 179.29 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 142FT.	DPHT TO 121.92 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 30

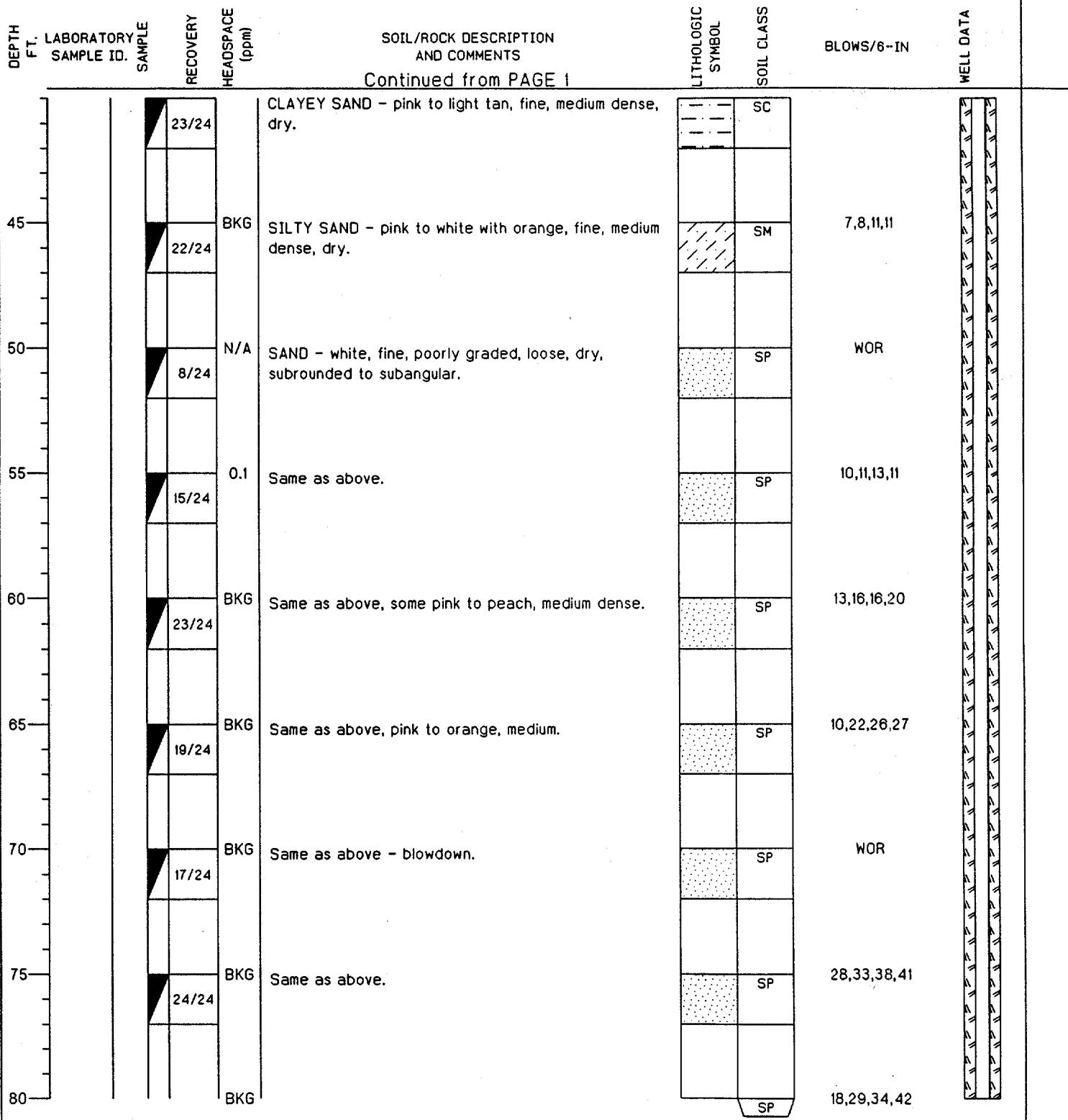


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/16/93	COMPLTD: 6/16/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 120-135 FT	PROTECTION LEVEL: D
TOC ELEV.: 179.29 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 142FT.	DPTH TO 121.92 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 30	

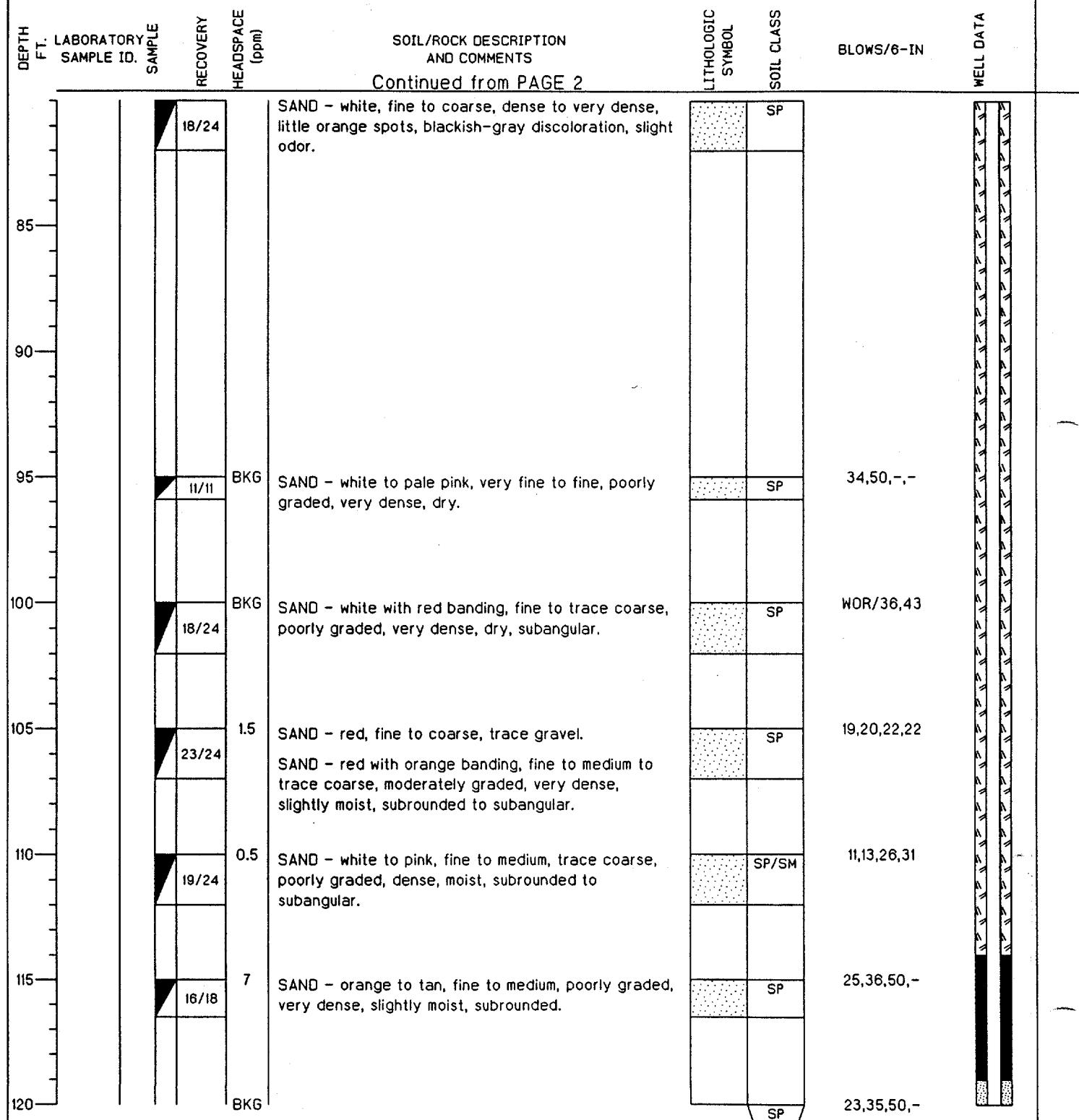


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-30-4		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 6/14/93	COMPLTD: 6/14/93				
METHOD: HSA	CASE SIZE: 2"		SCREEN INT.: 123-138 FT	PROTECTION LEVEL: D					
TOC ELEV.: 181.86 FT.	MONITOR INST.: FID/OVA		TOT DPTH: 138FT.	DPTH TO ↓ 124.76 FT.					
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 30						
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5									
10									
			22/24	BKG	CLAYEY SILT - red to yellowish orange, fine, medium dense, dry, Grade to sand, subrounded.		SM	4,7,9,15	
15				BKG	SAND - same as above, poorly graded.		SM	6,7,7,9	
20				BKG	SAND - red, fine, grade to white, fine to medium, medium dense, dry, subangular.		SP	4,9,12,12	
25				BKG	Same as above.		SP	6,11,13,15	
30				BKG	Same as above.		SP	5,11,16,16	
35				BKG	Same as above.		SP	15,26,27,29	
40				BKG			SC	7,8,9,11	

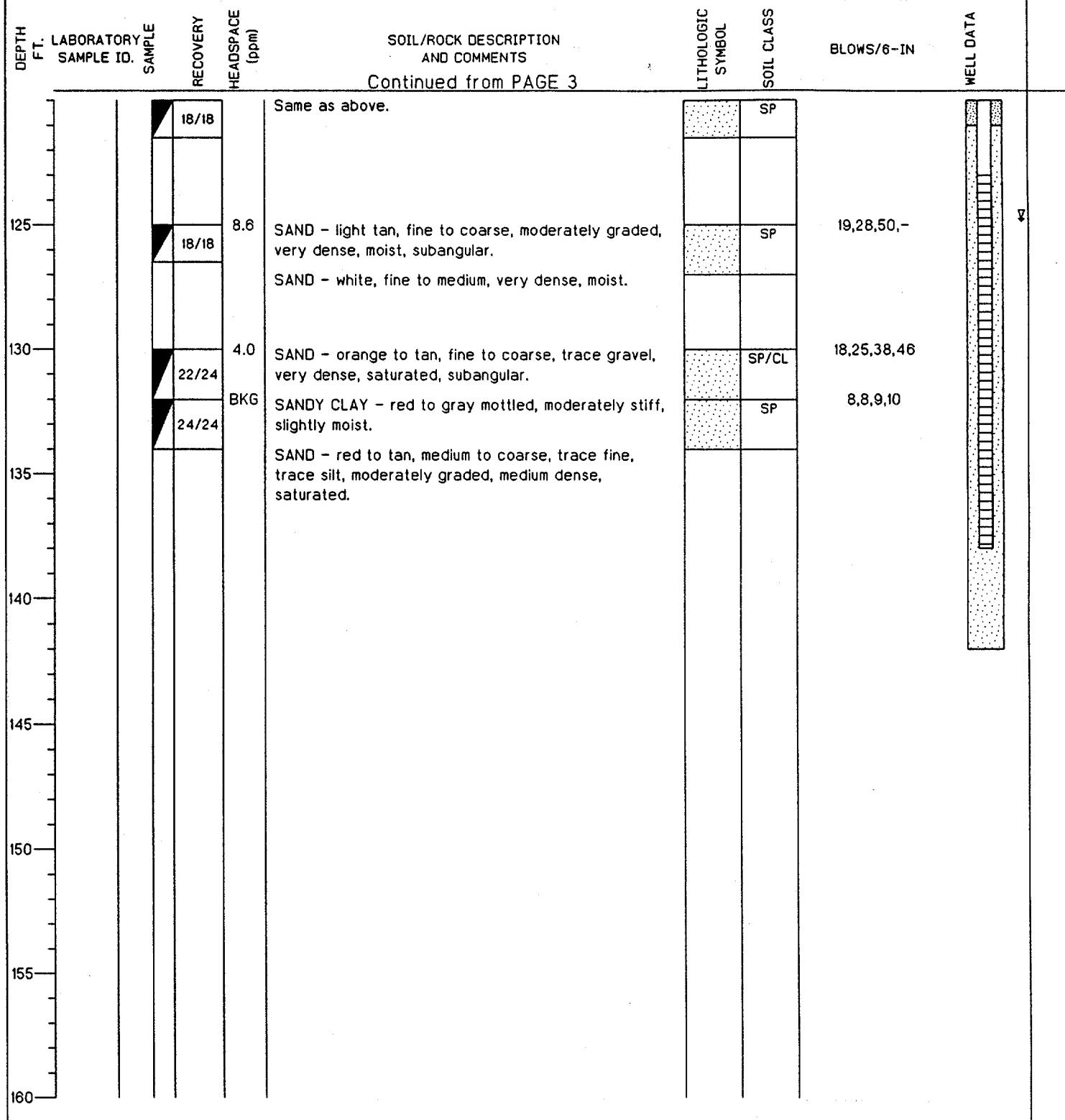
TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-30-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM	PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 6/14/93	COMPLTD: 6/14/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 123-138 FT PROTECTION LEVEL: D
TOC ELEV.: 181.86 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 138FT. DPTH TO ↓ 124.76 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 30



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/14/93	COMPLTD: 6/14/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 123-138 FT	PROTECTION LEVEL: 0
TOC ELEV.: 181.86 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 138FT.	DPTH TO 124.76 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:		SITE: 30

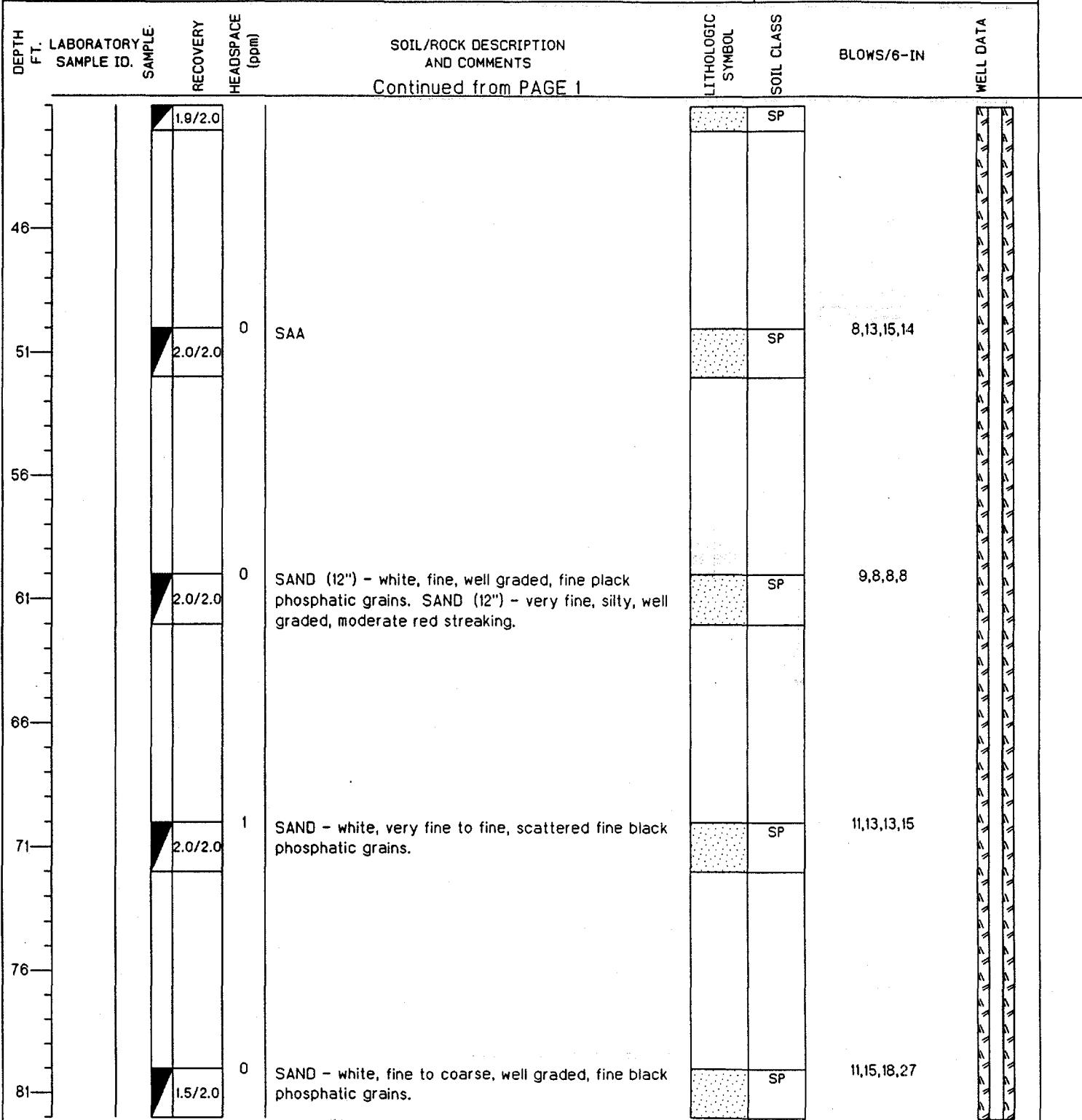


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/14/93	COMPLTD: 6/14/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 123-138 FT	PROTECTION LEVEL: D
TOC ELEV.: 181.86 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 138FT.	DPTH TO 124.76 FT.
LOGGED BY: N. Roka	WELL DEVELOPMENT DATE:	SITE: 30	



TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-30-5		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 6/23/93	COMPLTD: 6/25/93			
METHOD: HSA	CASE SIZE: 2"		SCREEN INT.: 149-159 FT		PROTECTION LEVEL: D			
TOC ELEV.: 182.15 FT.	MONITOR INST.: FID/OVA		TOT DPTH: 160FT.		DPTH TO 128.84 FT.			
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 30					
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SITE CLASS	BLOWS/6-IN	WELL DATA
5			0	SAND - moderate reddish brown, fine to medium, trace clay.	SP		4,6,8,20	
10			0	CLAYEY SAND - light brown to moderate red, fine to coarse, well graded.	SC		9,16,22,24	
15			0	SAND - moderate red, medium to coarse, well graded.	SP		18,23,25,28	
20			0	SANDY CLAY (8") - ligh brown to moderate red, fine, plastic. SAND (16") - moderate red, medium to coarse, well graded.	SC		8,11,15,16	
25								
30			0	CLAYEY SAND (2") - moderate brown, fine to medium. SAND (2") - moderate red, medium to coarse, well graded. SAND (14") - white to light orange brown, very fine to fine.	SP		12,14,18,21	
35								
40			0	SAND (12") - white, very fine to fine, very fine black phosphatic grains through out. SAND (12") - moderate red to orange to tan, mottled white, very fine to coarse.	SP		13,17,20,21	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 149-159 FT	PROTECTION LEVEL: D
TOC ELEV.: 182.15 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 160FT.	DPHT TO V 128.84 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 30



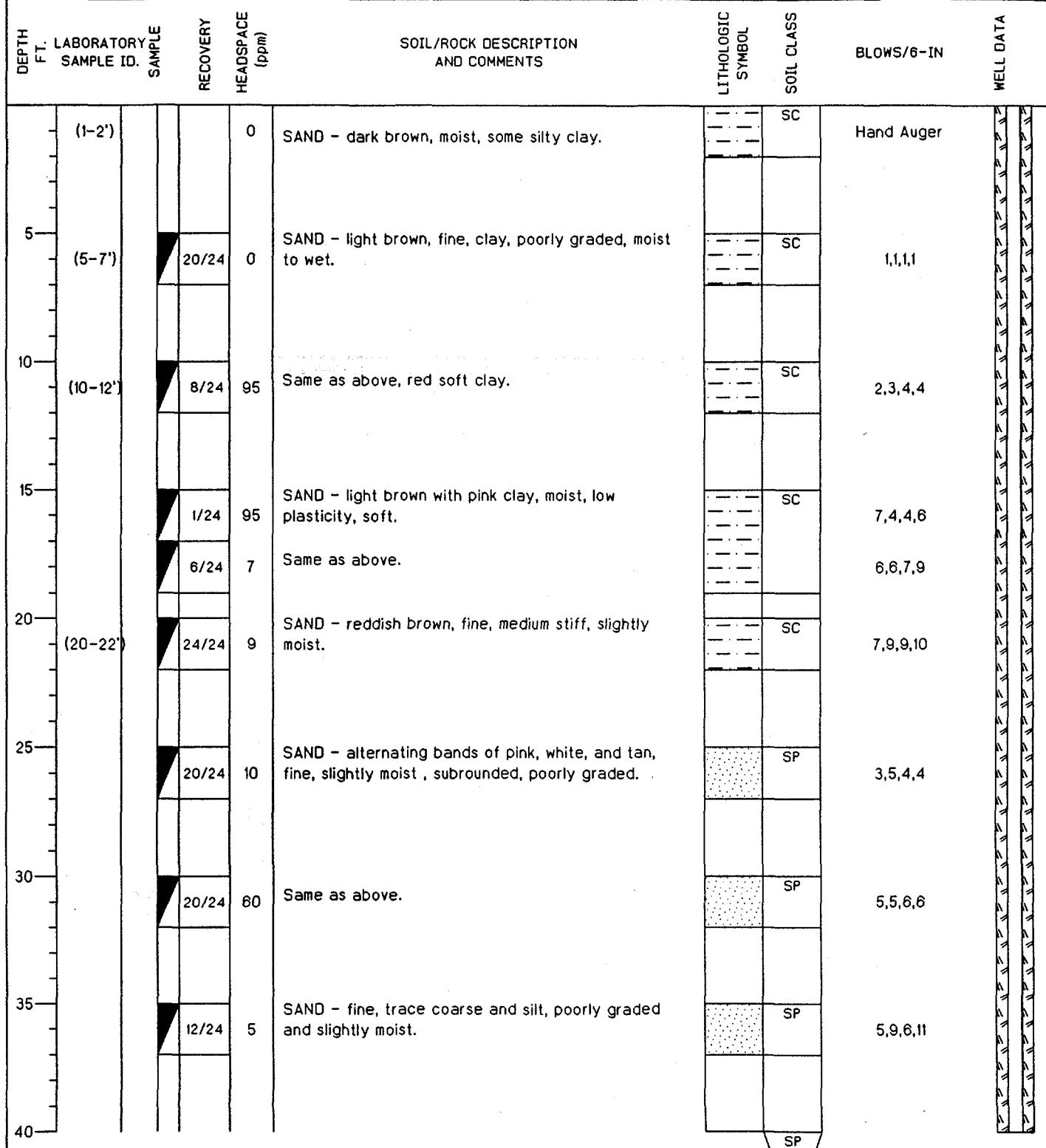
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 149-159 FT	PROTECTION LEVEL: D
TOC ELEV.: 182.15 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 160FT.	DPTH TO ↓ 128.84 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 30

DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY %	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 2							
87							
92		0	SAND - white to pink, fine to medium, trace coarse.	SP		11,16,23,25	
97		0	SAND - light orange to yellowish brown, medium to coarse, trace gravel.	SP		24,32,36,40	
102		0	SAND - tan to pale orange, medium to coarse, trace pebbles, mottled.	SP		18,21,30,42	
107		0	SAND - white to pale yellow orange, very fine to medium, poorly sorted , trace pebbles, slightly moist.	SP		22,24,34,37	
112		0	SAND - white, fine to medium, clay lens, slightly moist..	SP		19,28,36,41	
117		0	SAND (18") - moderate yellow orange, medium to coarse, wet. CLAYEY SAND (6") - mottled gray and orangish brown, very fine to silty.	SP		5,8,5,9	
		N/A	SANDY SILT - yello orange to pale gray, very fine, moist.	SM		13,16,19,26	
122		N/A	CLAY - gray, moderate red to orange brown mottling, plastic.	CL		3,5,12,15	
		N/A	CLAY - gray, plastic.			8,9,11,13	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-30-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 149-159 FT	PROTECTION LEVEL: D
TOC ELEV.: 182.15 FT.	MONITOR INST.: FID/OVA	TOT DPTH: 160FT.	DPTH TO ↓ 128.84 FT.
LOGGED BY: A. Cohen	WELL DEVELOPMENT DATE:		SITE: 30

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 3									
128		2.0/2.0	N/A		CLAY - light gray, plastic.	CL	CL	6,9,13,14	
128		2.0/2.0	N/A		CLAY - light gray to moderate yellowish brown, mottled, plastic, stiff.	CL	CL	11,13,18,22	
133		2.0/2.0	N/A		CLAY - light gray to moderate yellowish brown, plastic.	CL	CL	7,12,18,20	
133		2.0/2.0	N/A		CLAY - light gray to dark yellowish orange, stiff, slightly plastic, mottled.	CL	CL	13,16,23,?	
138		2.0/2.0	N/A		CLAY - light gray, stiff, plastic.	CL	CL	12,9,12,18	
143		2.0/2.0	N/A		CLAY - light gray to dark yellowish orange, mottled, moderately stiff, plastic.	CL	CL	0,0,14,14	
148		2.0/2.0	N/A		CLAY - light gray to dark yellowish orange, mosttled, stiff, plastic, slightly moist.	CL	CL	4,5,10,11	
153		2.0/2.0	N/A		CLAY (22") - light gray, moderately stiff, plastic. SAND (2") - moderate red to dark yellowish orange, medium to coarse, saturated.	CL	CL	0,0,0,0	
158		1.0/2.0	N/A		CLAY (22") - gray to dark yellowish orange, mottled. SAND (2") - dark yellowish orange, medium to coarse, saturated.	CL	CL	12,16,17,19	
163		2.0/2.0	N/A		SAND - dark yellowish orange, fine to medium, well graded, saturated.	SP	SP	25,35,38,44	

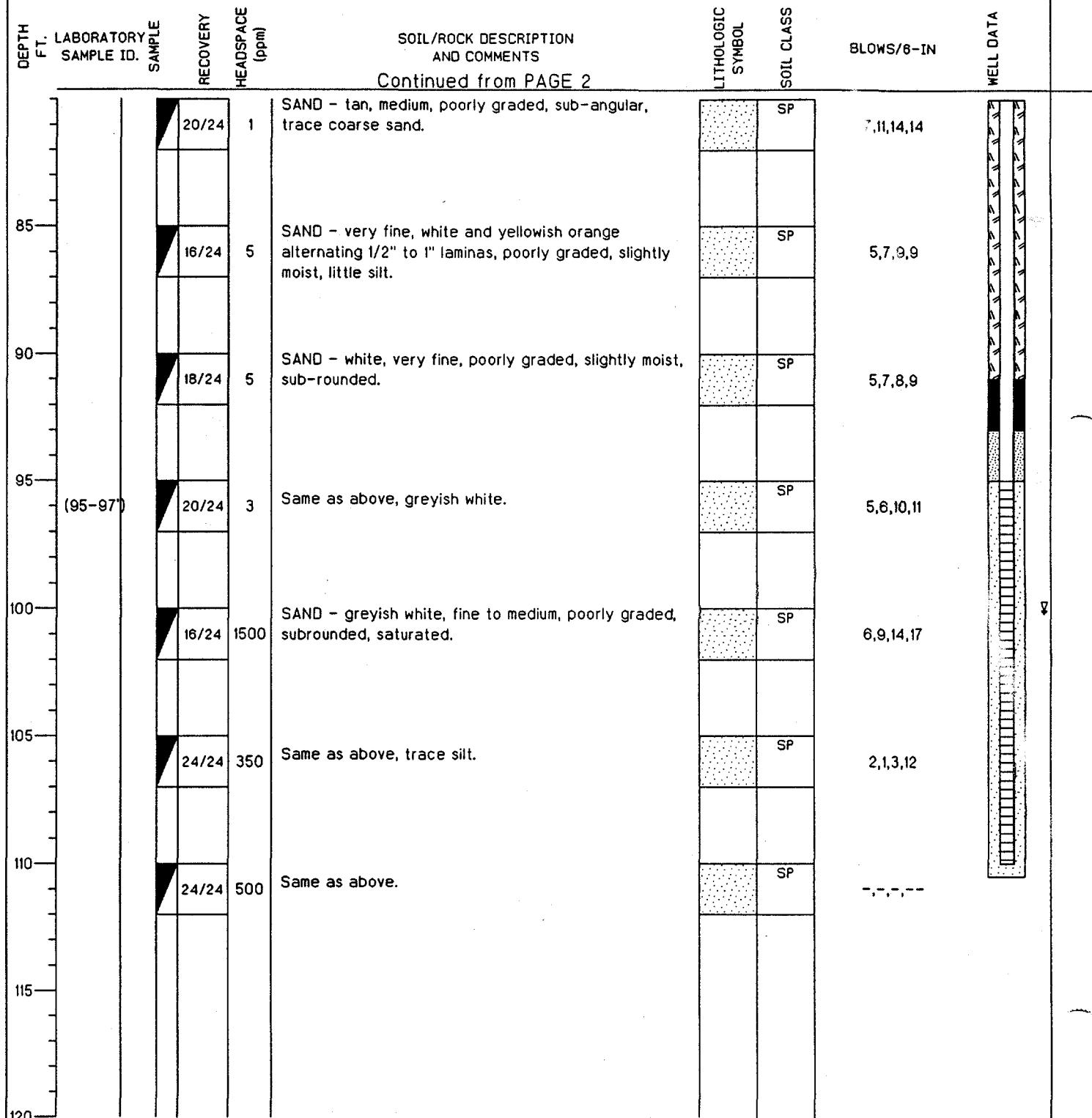
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-32-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/19/93	COMPLTD: 01/22/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 95-110	PROTECTION LEVEL: B & C
TOC ELEV.: FT.	MONITOR INST.: OVA	TOT DPTH: 110FT.	DPHT TO ↓ 100.09 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 32 - Northfield Hangar



TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-32-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/19/93	COMPLTD: 01/22/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 95-110	PROTECTION LEVEL: B & C
TOC ELEV.: FT.	MONITOR INST.: OVA	TOT DPTH: 110FT.	DPTH TO 100.09 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:	SITE: 32 - Northfield Hangar	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1								
45 (45-47)		20/24	50	SAND - white, fine, poorly graded, slightly moist.	SP		10,7,8,10	
50		24/24	160	Same as above, trace silt and coarse sand.	SP		12,9,9,8	
55		20/24	< 1	SAND - white, fine, poorly graded, sub-rounded, slightly moist, trace coarse sand.	SP		Pushed	
60 (61-63')		20/24	60	Same as above with some pink silty sand at 56.5 ft, no coarse sand.	SP		Pushed	
65		20/24	7	SAND - white, fine, poorly graded, subrounded, slightly moist.	SP		12,14,20,28	
70		18/24	6	Same as above, trace silt at 66 ft.	SP		5,9,14,16	
75		18/24	6	SAND - white, medium, poorly graded, trace coarse, slightly moist, subangular.	SP		5,8,12,14	
80		18/24	6	SAND - tan, fine to medium, poorly graded, trace coarse sand and silt.	SP		6,6,7,21	

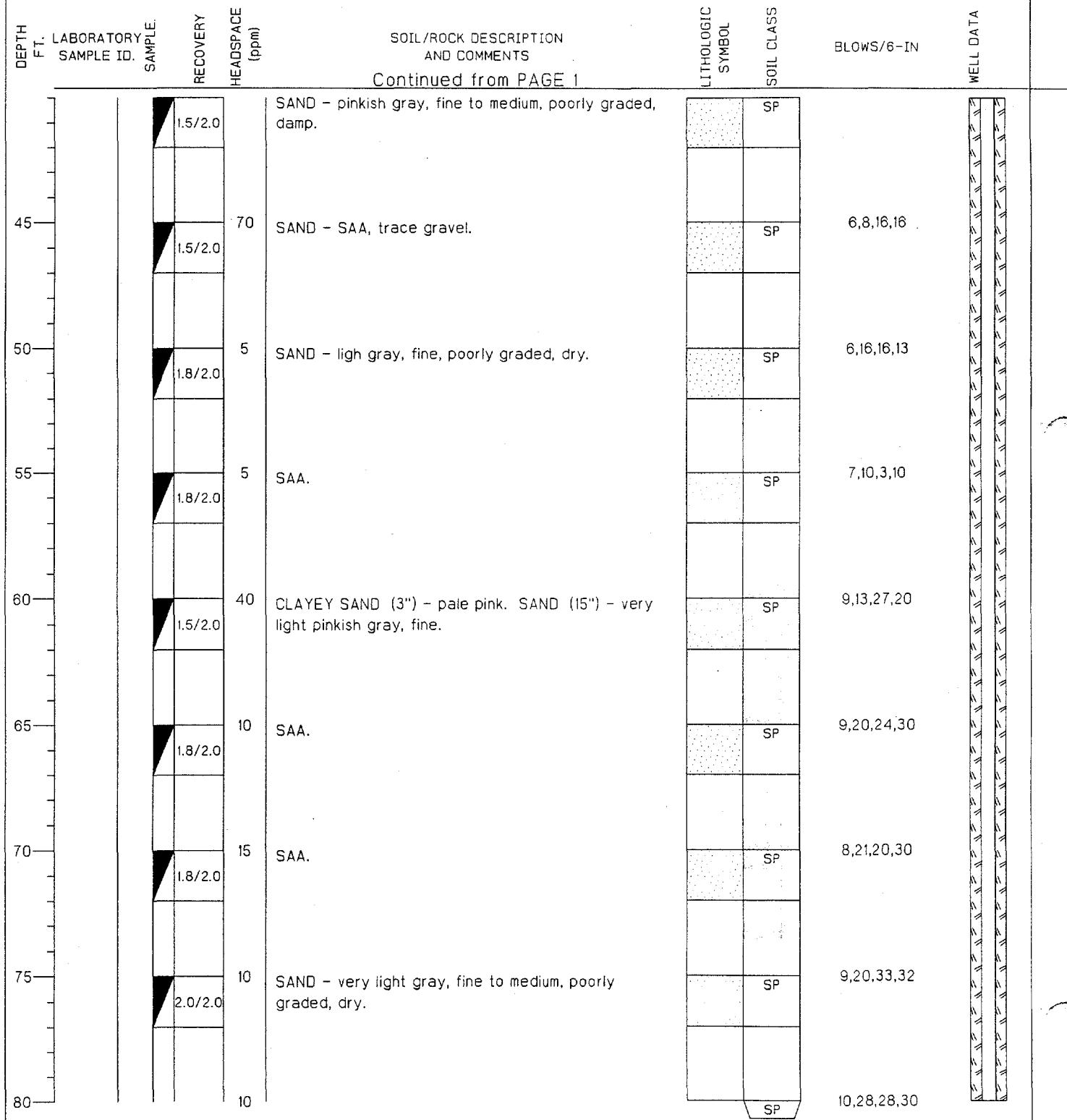
TITLE: NAVAL AIR STATION WHITING FIELD		LOG of WELL: WHF-32-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 01/19/93	COMPLTD: 01/22/93
METHOD: HSA	CASE SIZE: 2"	SCREEN INT.: 95-110	PROTECTION LEVEL: B & C
TOC ELEV.: FT.	MONITOR INST.: OVA	TOT DPTH: 110FT.	DEPTH TO 100.09 FT.
LOGGED BY: R. Nelson	WELL DEVELOPMENT DATE:		SITE: 32 - Northfield Hangar



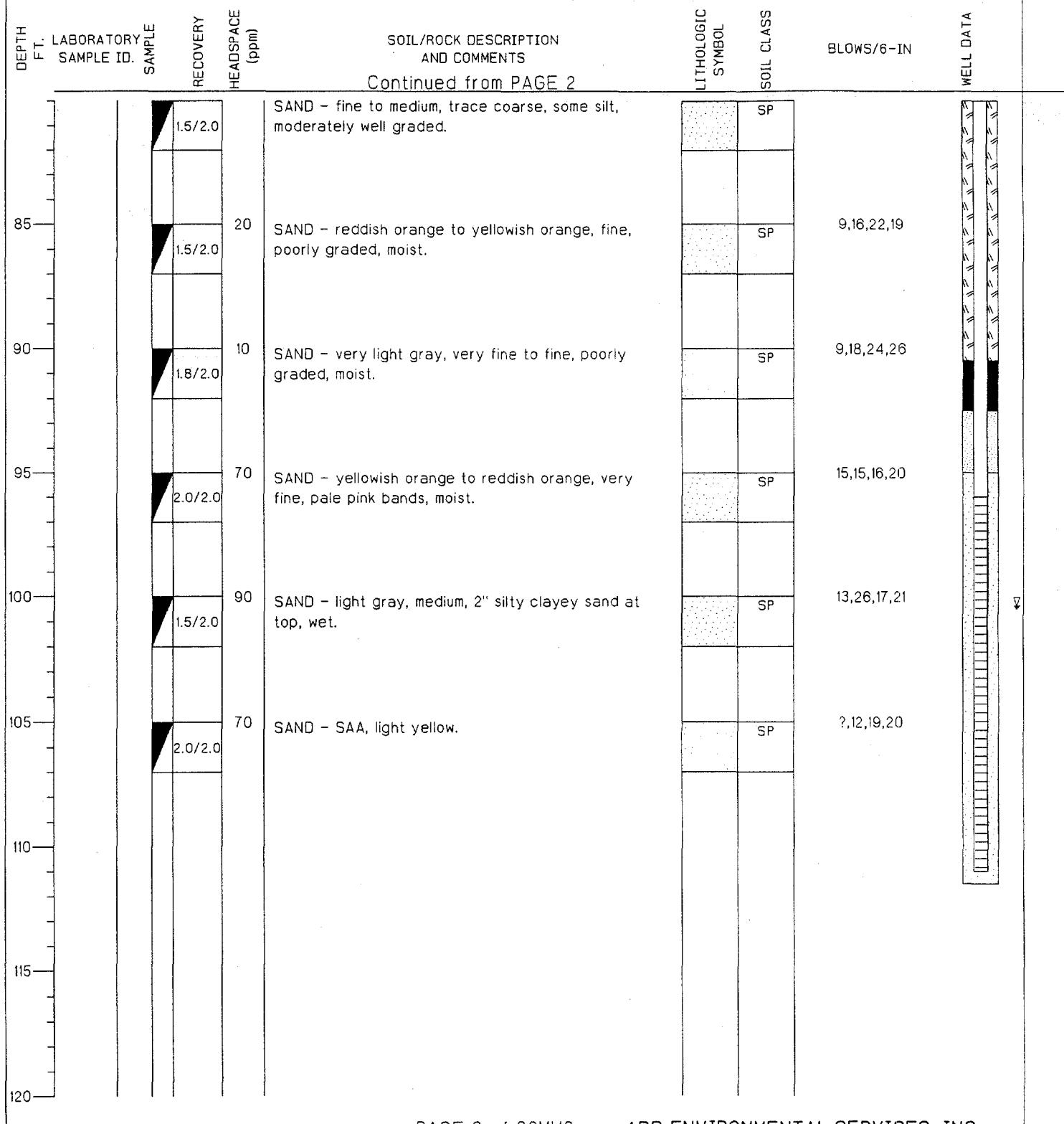
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93	COMPLTD: 6/28/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 96-111 FT	PROTECTION LEVEL: B,D
TOC ELEV.: 172.61 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPHT TO 100.40 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 32

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				0	SILTY SAND - dark yellowish orange, fine, damp to dry.	/\ / \ / \ /	SM	2,2,2,3	
10				<1	CLAYEY SILTY SAND - moderate reddish orange, fine to medium.	/\ / \ / \ /	SM	6,7,7,9	
15				30	CLAYEY SAND - moderate reddish orange, fine to medium, damp.	— — — —	SC	2,4,6,6	
20				30	CLAYEY SAND (10") SAND (10") - reddish orange, fine, damp.	— — — —	SC/SP	2,3,10,5	
25				70	SAND - reddish orange, to yellowish orange, fine to medium.		SP	3,4,5,8	
30				70	SAND - pinkish gray, fine to medium, some silt, poorly graded, damp.		SP	5,6,9,10	
35				65	SAND - pinkish to yellowish gray, fine to medium, trace coarse & gravel, poorly graded, sub-angular.		SP	2,5,10,9	
40				300			SP	6,10,13,13	

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93	COMPLTD: 6/28/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 96-111 FT	PROTECTION LEVEL: B,D
TOC ELEV.: 172.61 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPTH TO 100.40 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 32	

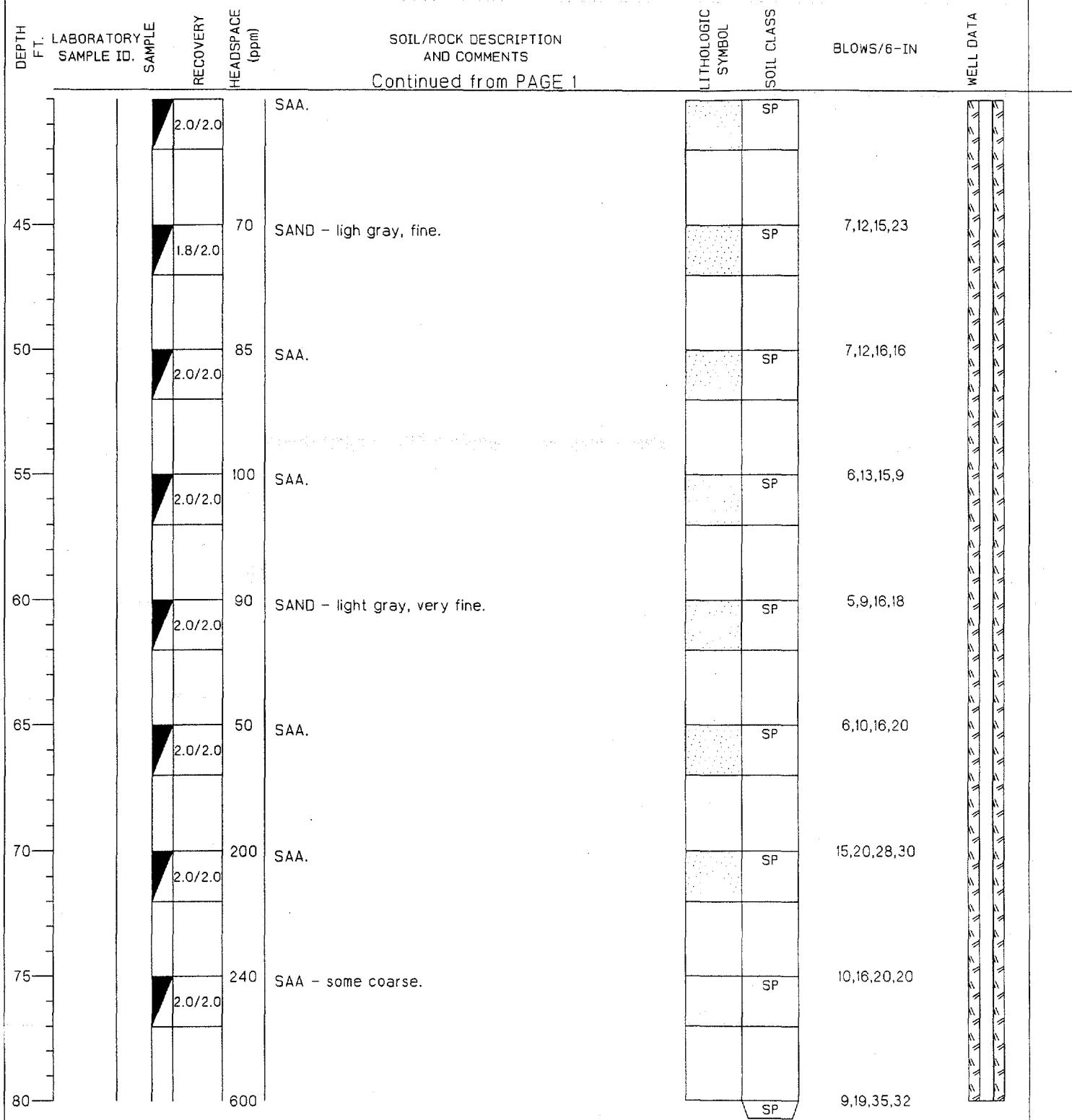


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/27/93	COMPLTD: 6/28/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 96-111 FT	PROTECTION LEVEL: B,D
TOC ELEV.: 172.61 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPTH TO 100.40 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 32	

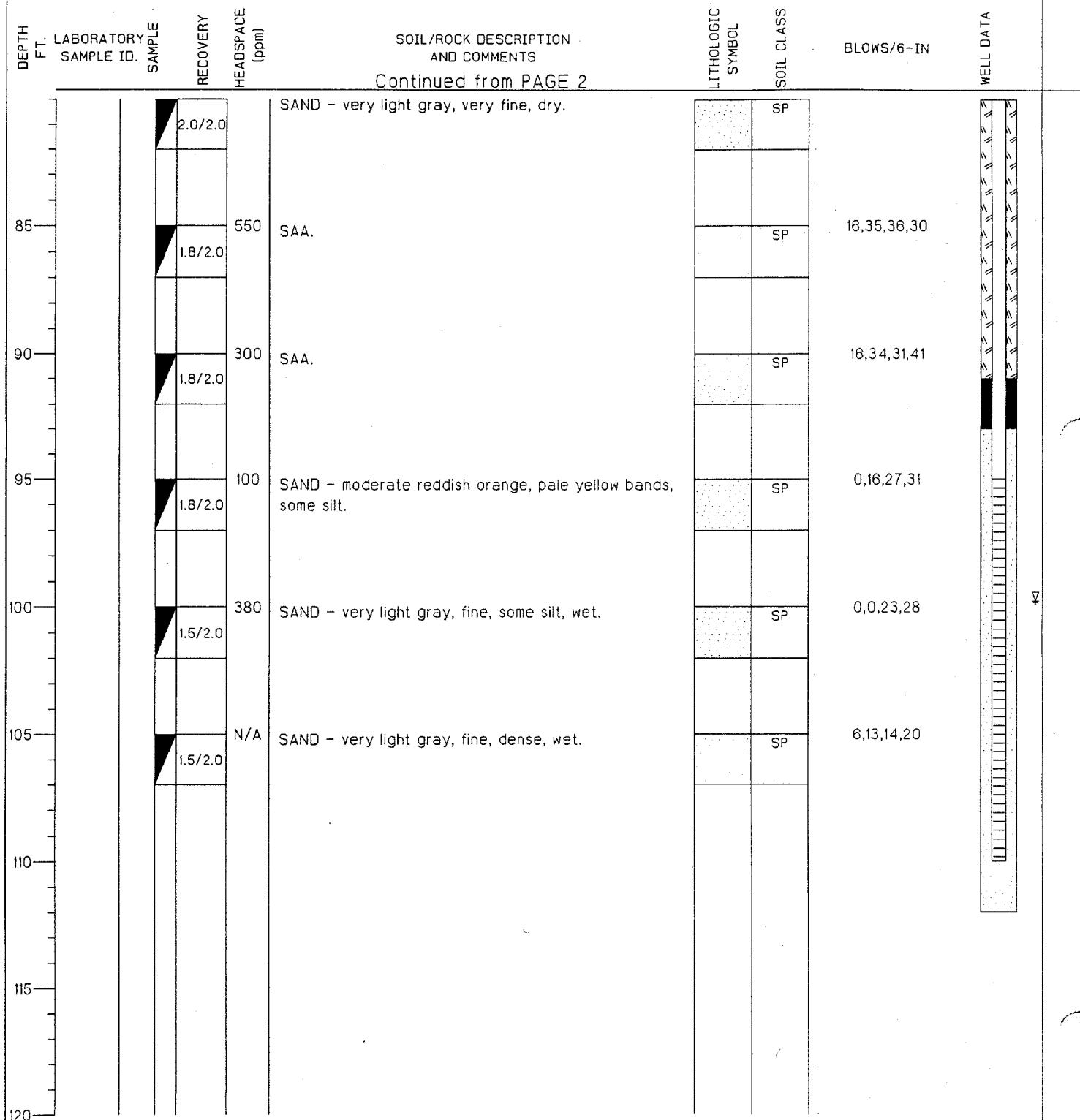


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-32-3		BORING NO.				
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA				
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 6/26/93	COMPLTD: 6/26/93					
METHOD: HOLLOW STEM AUGER		CASE SIZE: 2"	SCREEN INT.: 95-110 FT		PROTECTION LEVEL: D, Mod. D					
TOC ELEV.: 172.58 FT.		MONITOR INST.: FID & OVA	TOT DPTH: 112FT.		DPTH TO 99.79 FT.					
LOGGED BY: G. Kanchibhatla		WELL DEVELOPMENT DATE:			SITE: 32					
DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS			LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA		
5	1.5/2.0	1 2 4 30 15 30 15 50 110	SILTY SAND - light yellow to reddish orange, fine, some clay.	SAA. SAA. SAA. SAA. SAND - pale yellow to light orange, fine, poorly graded, some silt, trace clay, trace grave, sub-rounded. SAA - white, no silt.						
10	1.5/2.0									
15	1.5/2.0									
20	1.5/2.0									
25	1.75/2.0									
30	1.75/2.0									
35	2.0/2.0									
40	70									

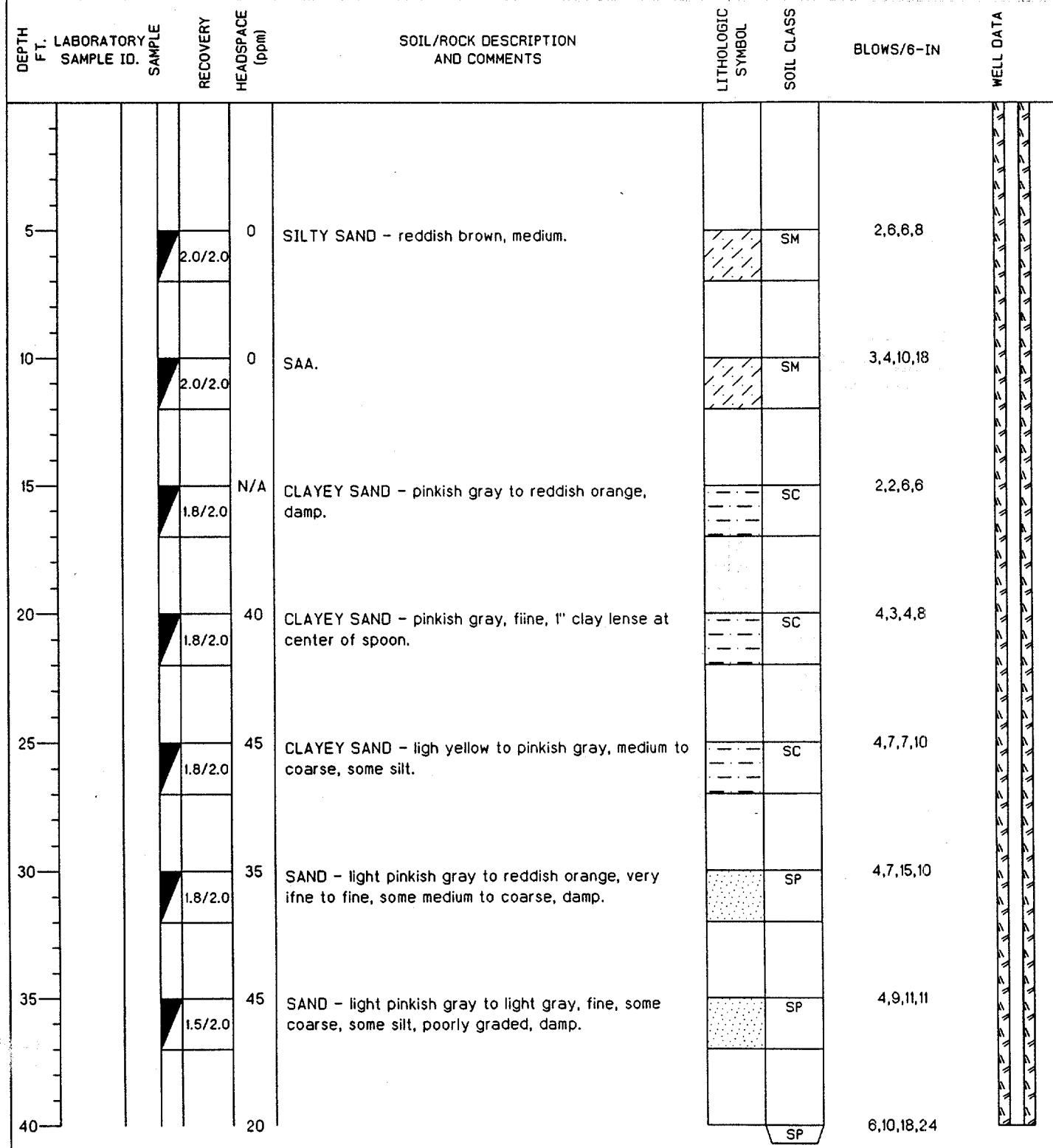
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/26/93	COMPLTD: 6/26/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 172.58 FT.	MONITOR INST.: FIO & OVA	TOT DPTH: 112FT.	DPHT TO 99.79 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 32



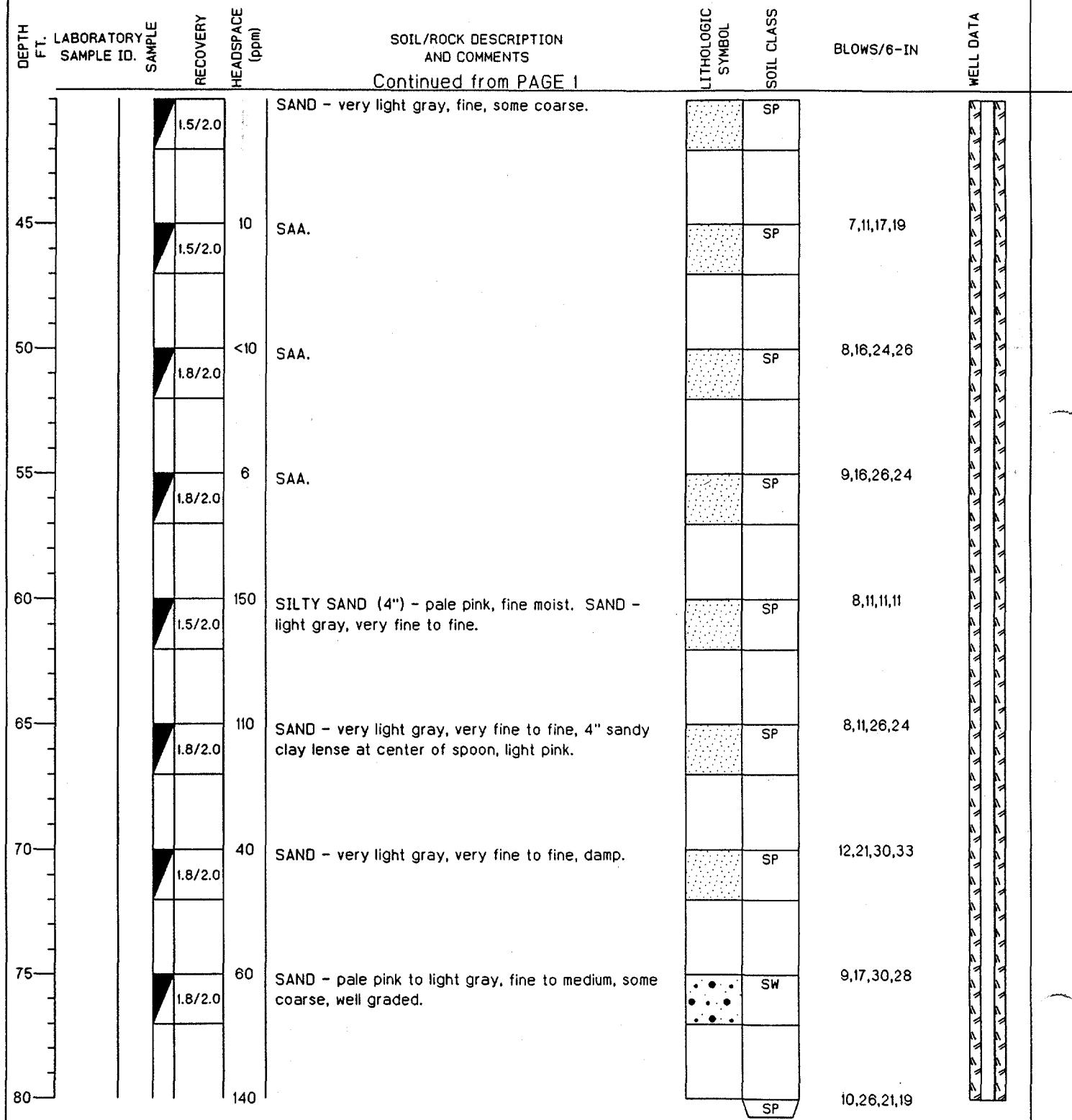
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/26/93	COMPLTD: 6/26/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 172.58 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPHTH TO 99.79 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 32	



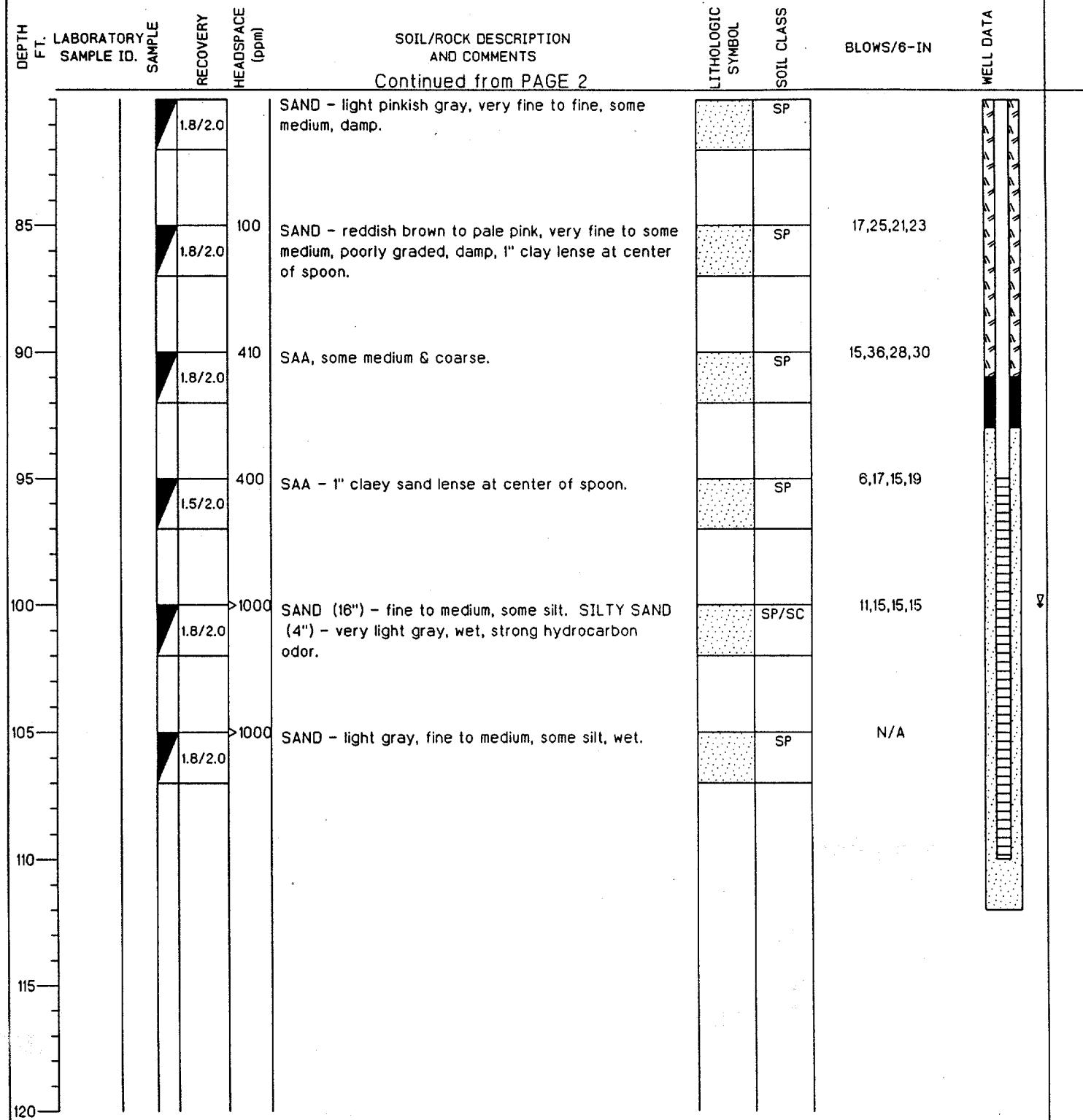
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/29/93	COMPLTD: 6/29/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 172.07 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPHT TO 99.98 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 32	



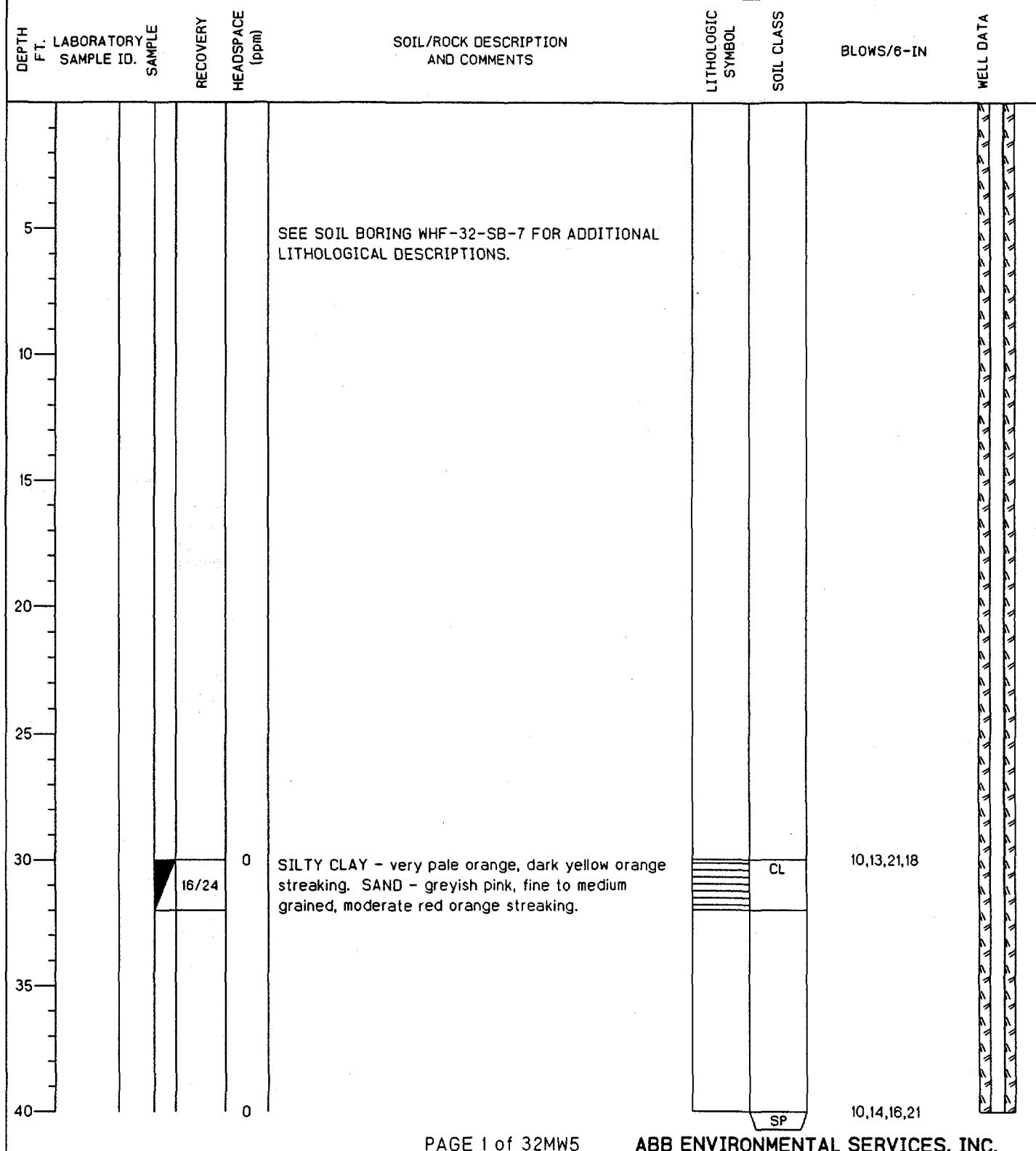
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/29/93	COMPLTD: 6/29/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 172.07 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPTH TO ↓ 99.98 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 32



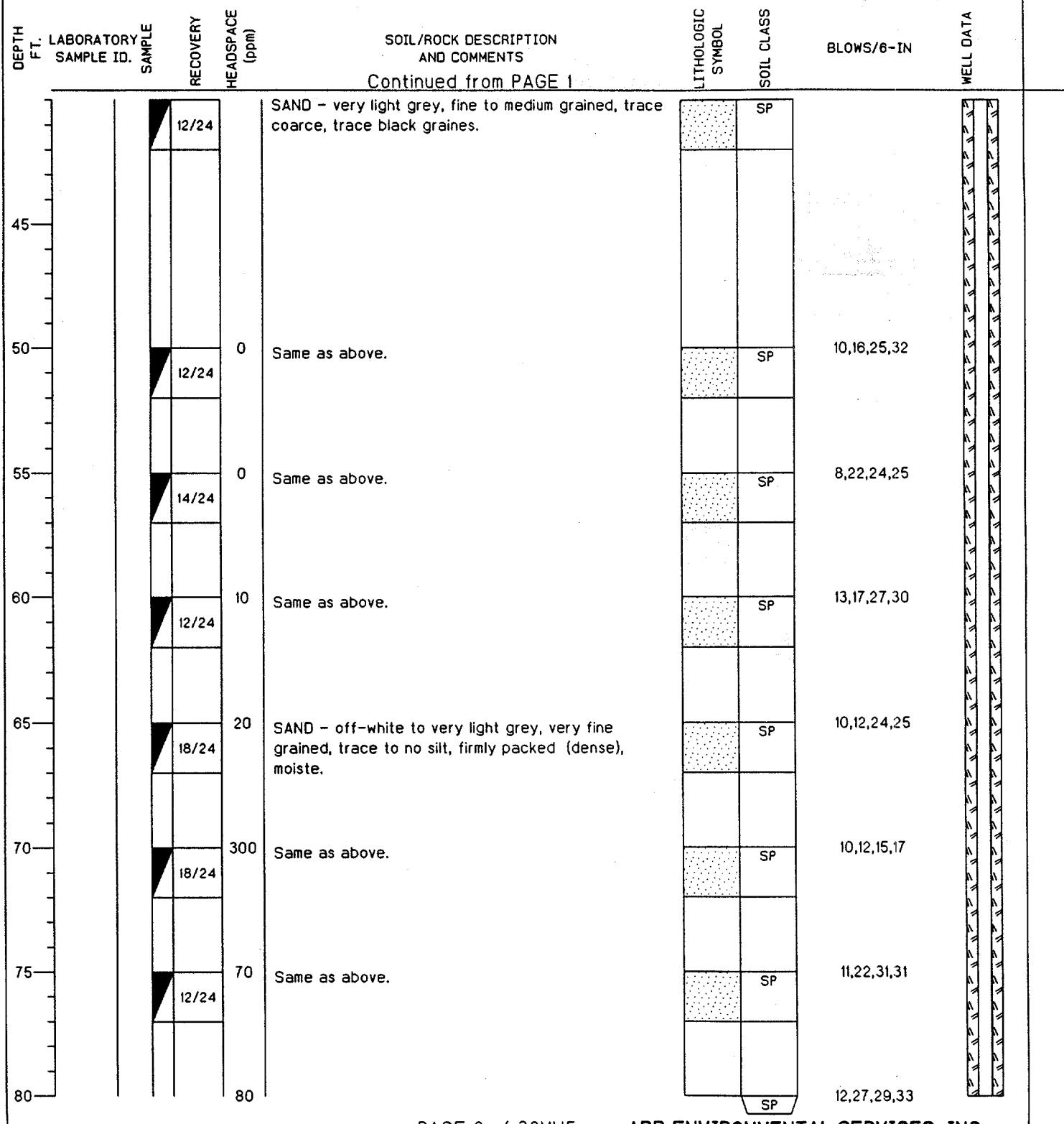
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/29/93	COMPLTD: 6/29/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 95-110 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV: 172.07 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 112FT.	DPTH TO ↓ 99.98 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 32



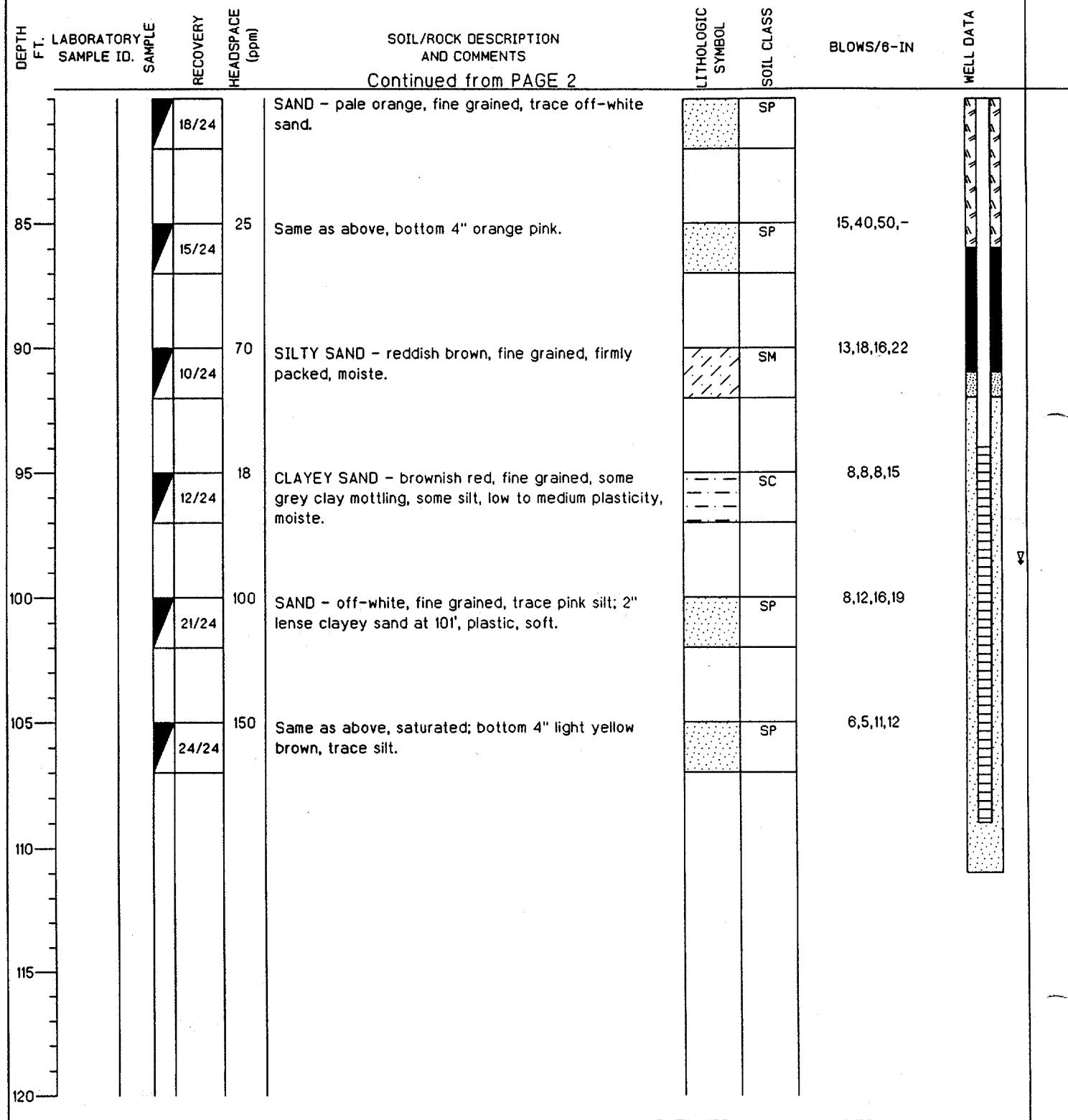
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/23/93	COMPLTD: 5/24/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 94-109 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 0 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 109FT.	DPTH TO ↓ 98.60 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 32	



TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/23/93	COMPLTD: 5/24/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 94-109 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 0 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 109FT.	DPHT TO 98.60 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:		SITE: 32



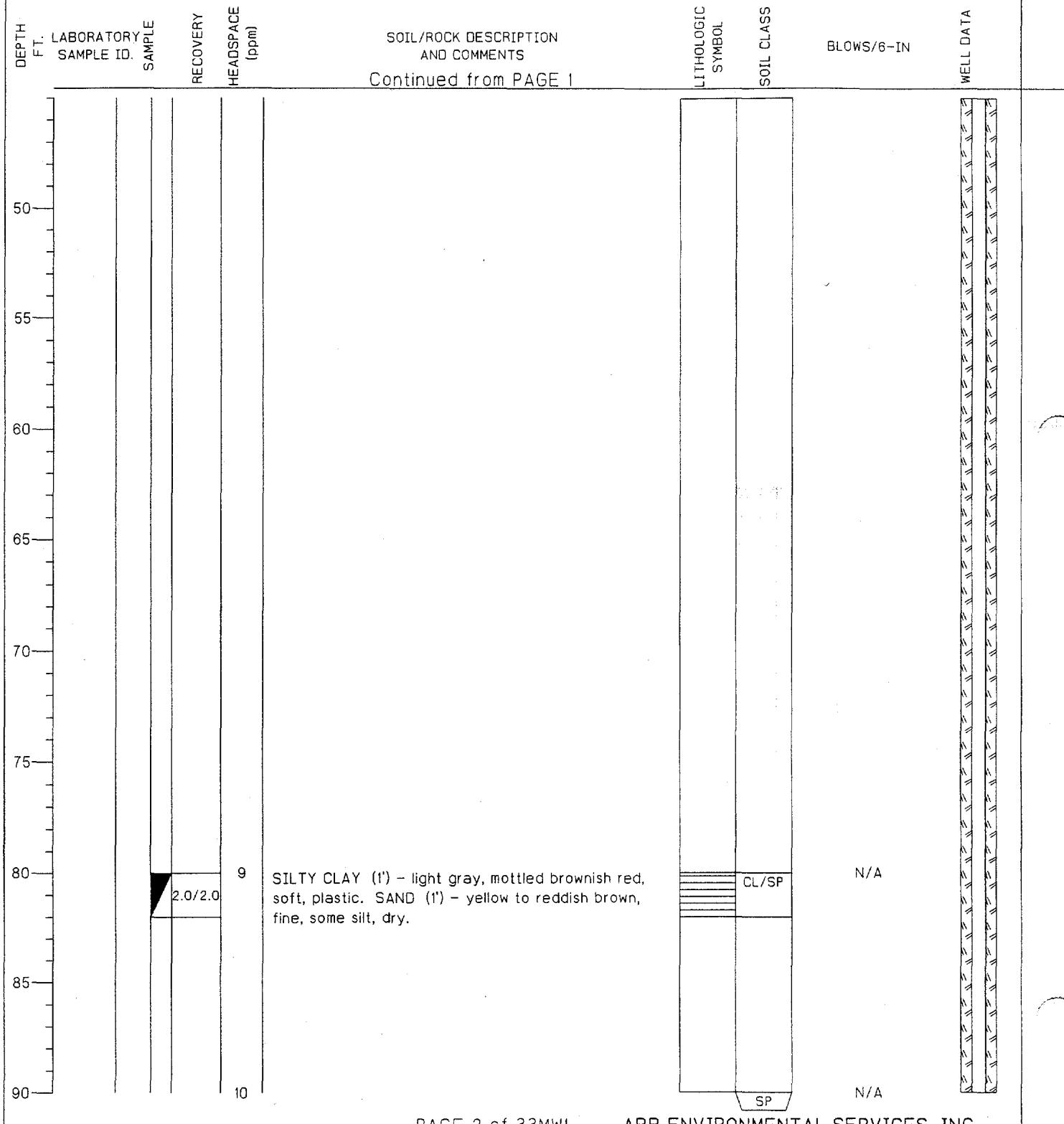
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-32-5	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/23/93	COMPLTD: 5/24/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 94-109 FT	PROTECTION LEVEL: D, Mod. D
TOC ELEV.: 0 FT.	MONITOR INST.: FID & OVA	TOT DPTH: 109FT.	DPTH TO ↓ 98.60 FT.
LOGGED BY: D. Wong	WELL DEVELOPMENT DATE:	SITE: 32	



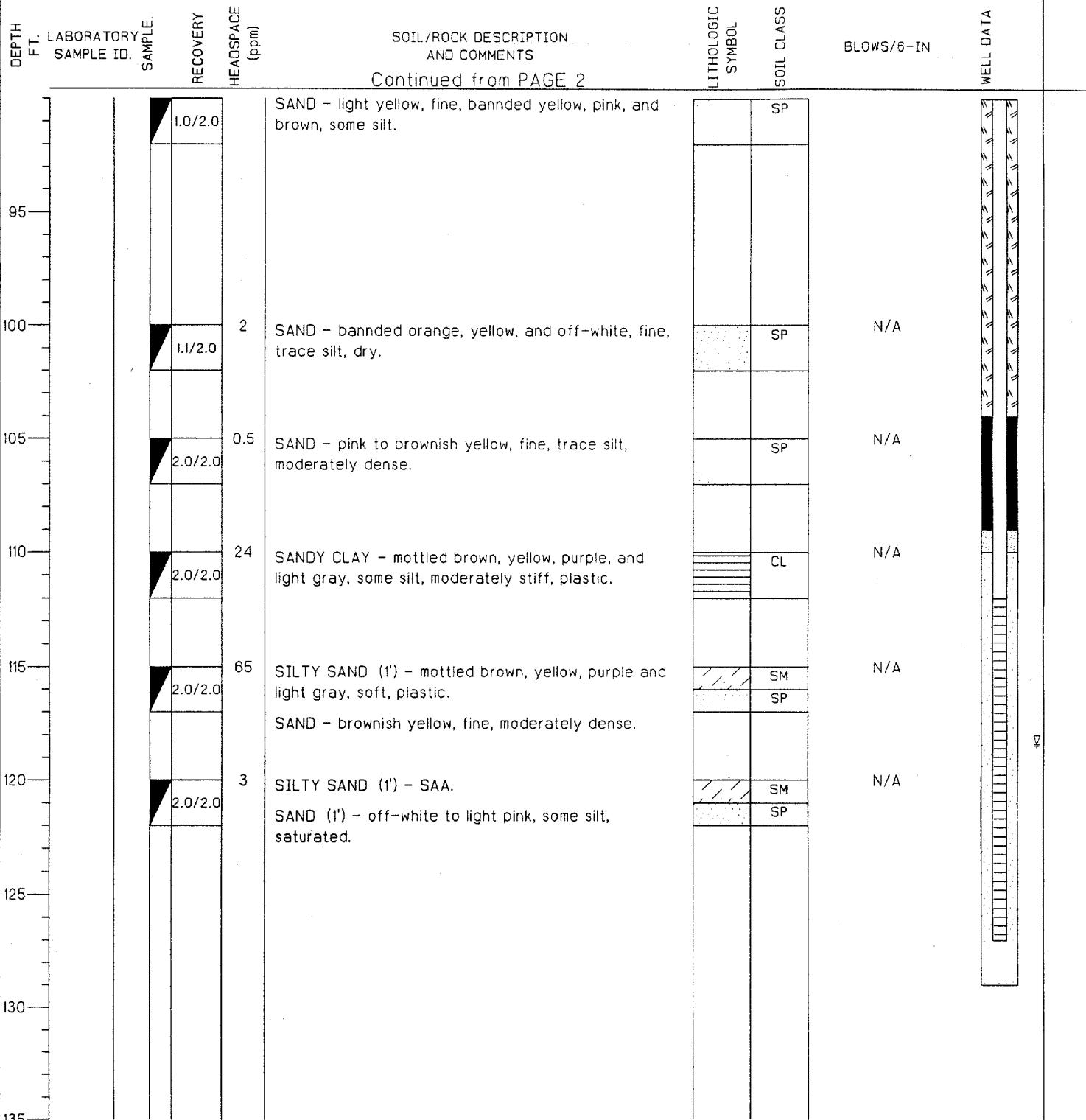
TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/14/93	COMPLTD: 6/15/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 112-127 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 180.78 FT.	MONITOR INST.: OVA	TOT DPTH: 129FT.	DPTH TO 118.43 FT.
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:	SITE: 33	

DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			SEE WHF-33-2 FOR LITHOLOGICAL DESCRIPTIONS.				
10							
15							
20							
25							
30							
35							
40							
45							

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/14/93	COMPLTD: 6/15/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 112-127 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 180.78 FT.	MONITOR INST.: OVA	TOT DPTH: 129FT.	DPHTH TO ∇ 118.43 FT.
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:		SITE: 33



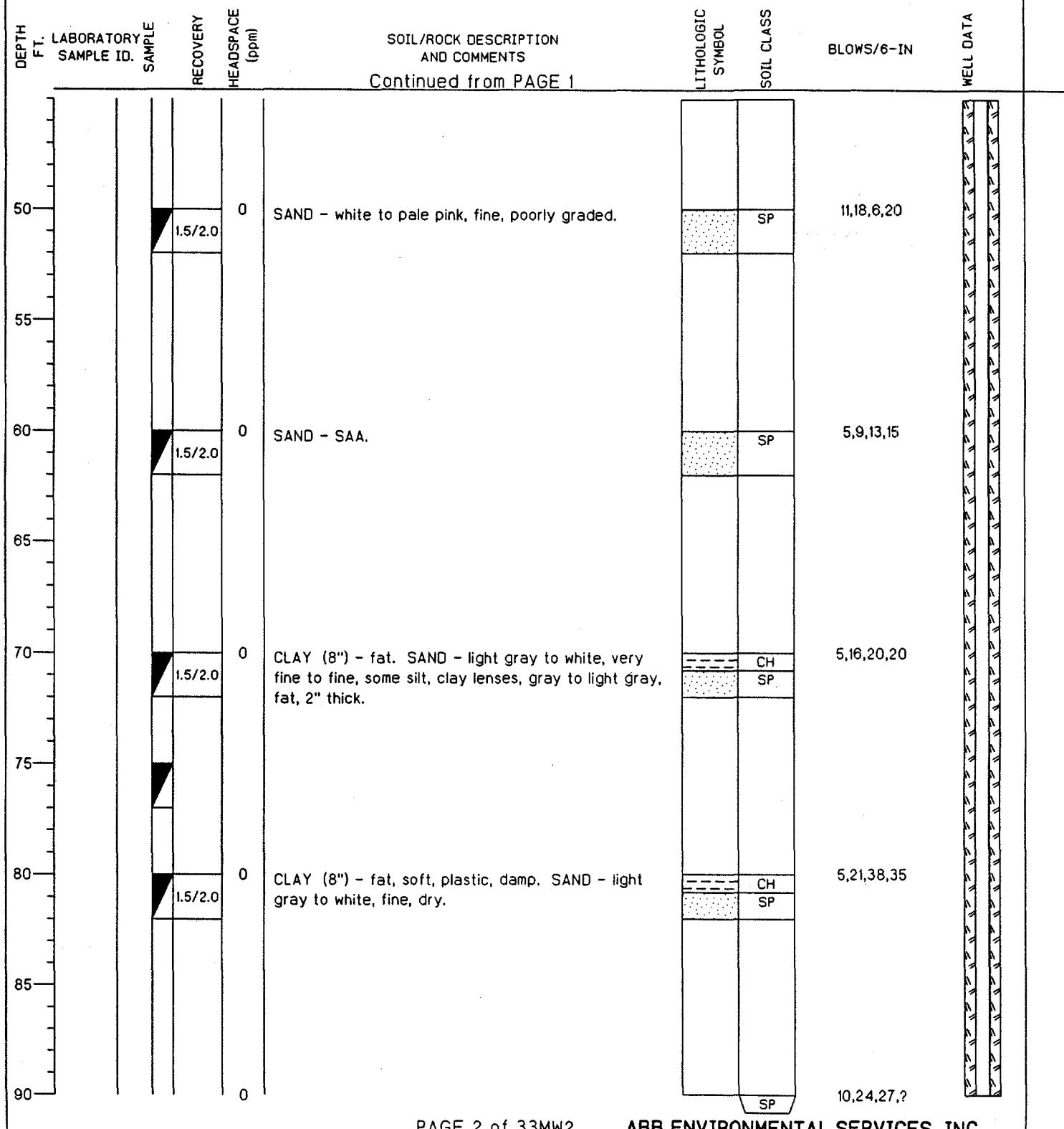
TITLE: Naval Air Station Whiting Field		LOG OF WELL: WHF-33-1	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/14/93	COMPLTD: 6/15/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 112-127 FT.	PROTECTION LEVEL: B,D
TOC ELEV.: 180.78 FT.	MONITOR INST.: OVA	TOT DPTH: 129FT.	DEPTH TO 118.43 FT.
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:	SITE: 33	



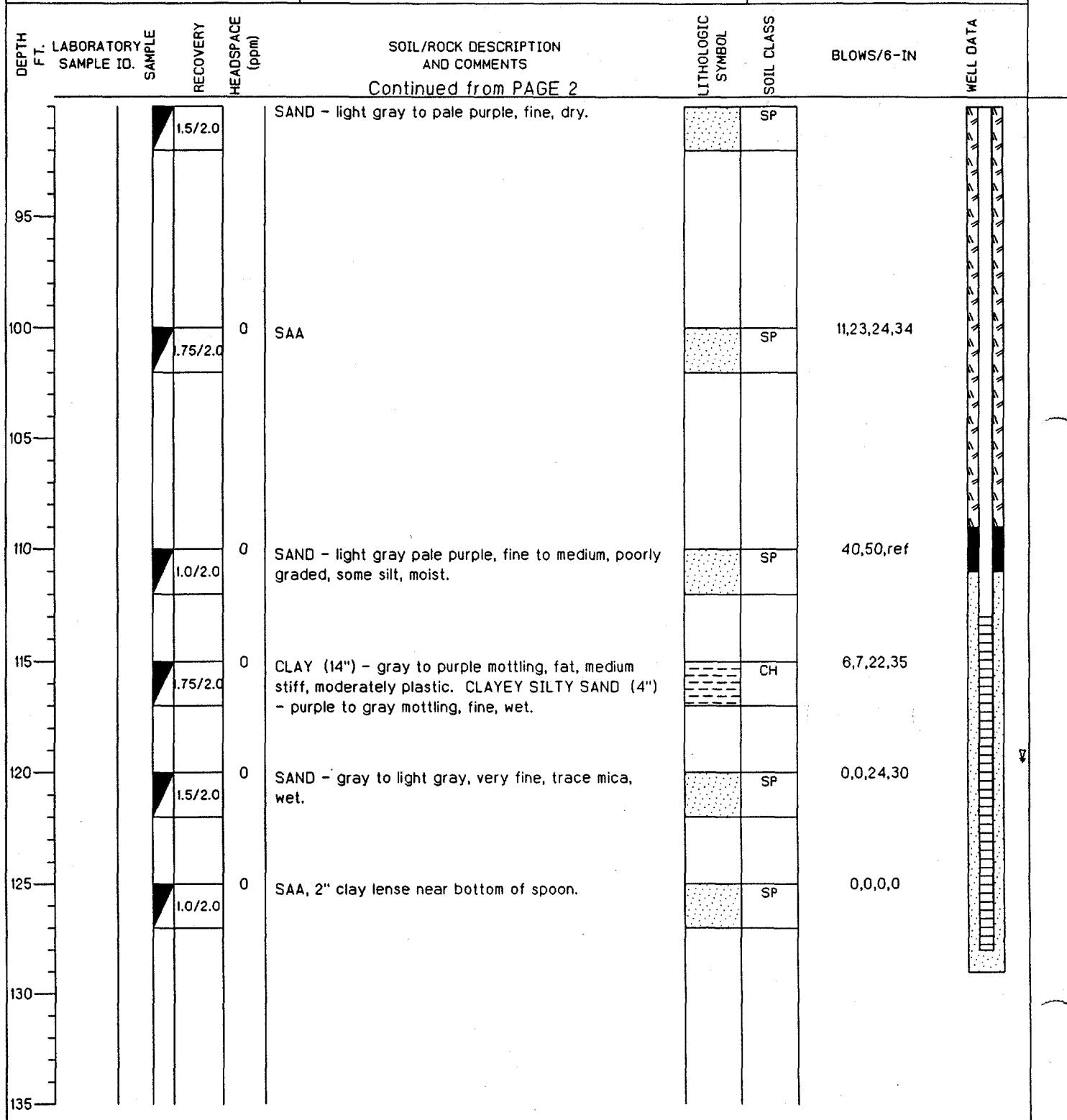
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CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV.: 181.71 FT.	MONITOR INST.: OVA	TOT DPTH: 130FT.	DPTH TO ↓ 119.39 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 33	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5								
10			0	SILTY SAND - reddish brown, fine, poorly graded, slightly moist.	/\ / \ / \ /	SM	3,4,5,4	
15								
20		2.0/2.0	0	SAA	/\ / \ / \ /	SM	3,3,5,4	
25								
30		2.0/2.0	0	SILTY SAND (10") - SAA. SAND (14") - white, very fine to fine, 4" lense of silty sand, beige to light orange.	/\ / \ / \ /	SM	3,8,9,22	
35								
40		1.5/2.0	0	SAND - white, very fine to fine, poorly graded.	.....	SP	7,13,17,16	
45								

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV: 181.71 FT.	MONITOR INST.: OVA	TOT DPTH: 130FT.	DPTH TO ↓ 119.39 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 33

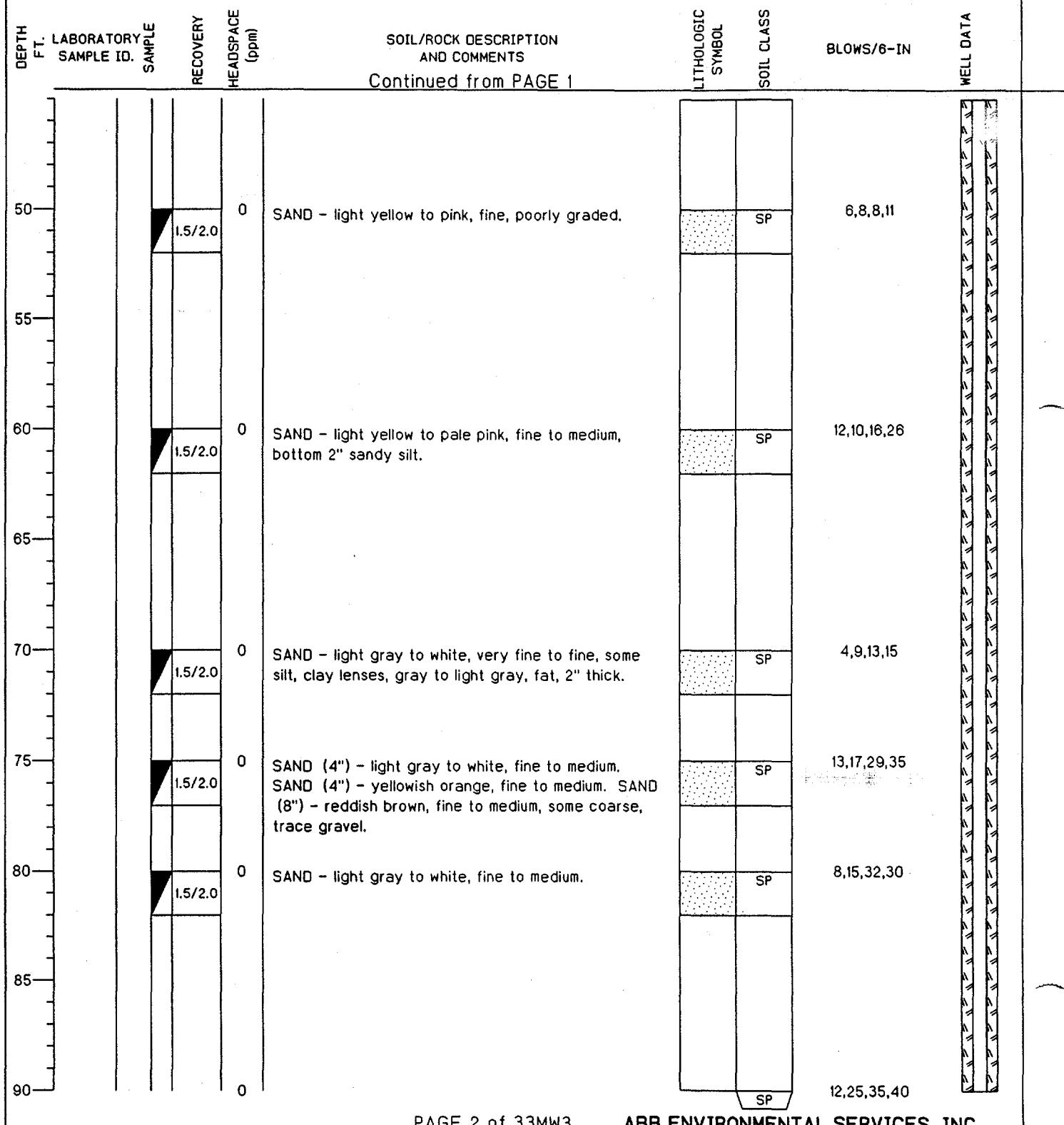


TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-2	BORING NO.
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/23/93	COMPLTD: 6/25/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV.: 181.71 FT.	MONITOR INST.: OVA	TOT DPTH: 130FT.	DPHT TO ↓ 119.39 FT.
LOGGED BY: G. Kanchibhatta	WELL DEVELOPMENT DATE:	SITE: 33	

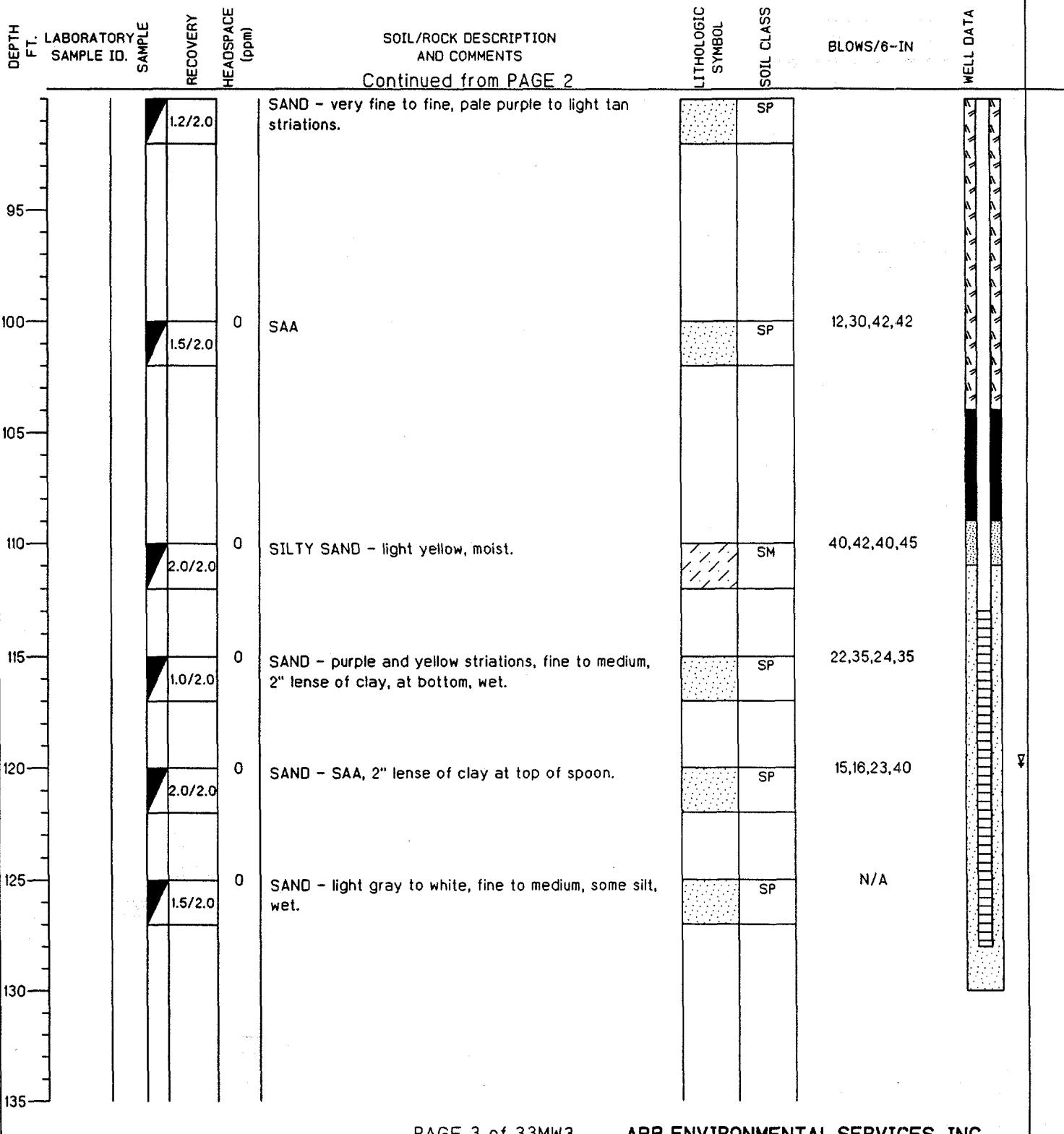


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-33-3		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM				PROJECT NO: RI PHASE IIA					
CONTRACTOR: Groundwater Protection Inc.				DATE STARTED: 6/22/93	COMPLTD: 6/23/93				
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"			SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D				
TOC ELEV.: 182.01 FT.	MONITOR INST.: OVA			TOT DPTH: 130FT.	DPTH TO V 119.84 FT.				
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:			SITE: 33					
DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOCIAL CLASS	BLOWS/6-IN	WELL DATA
5									
10				0	SILTY SAND - reddish brown, fine, poorly graded.		SM	3,2,3,4	
15									
20				0	SAA		SM	6,6,5,4	
25									
30				0	SAND - reddish brown to white, very fine to fine, poorly graded.		SP	4,5,10,10	
35									
40				0	SAND - white, very fine to fine, poorly graded.		SP	3,10,12,20	
45									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/22/93	COMPLTD: 6/23/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV.: 182.01 FT.	MONITOR INST.: OVA	TOT DPTH: 130FT.	DPTH TO ↓ 119.84 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 33



TITLE: Naval Air Station Whiting Field	LOG of WELL: WHF-33-3	BORING NO.
CLIENT: SOUTHNAVFACENGCOM	PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.	DATE STARTED: 6/22/93	COMPLTD: 6/23/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT. PROTECTION LEVEL: D
TOC ELEV.: 182.01 FT.	MONITOR INST.: OVA	TOT DPTH: 130FT. DPTH TO ↓ 119.84 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:	SITE: 33

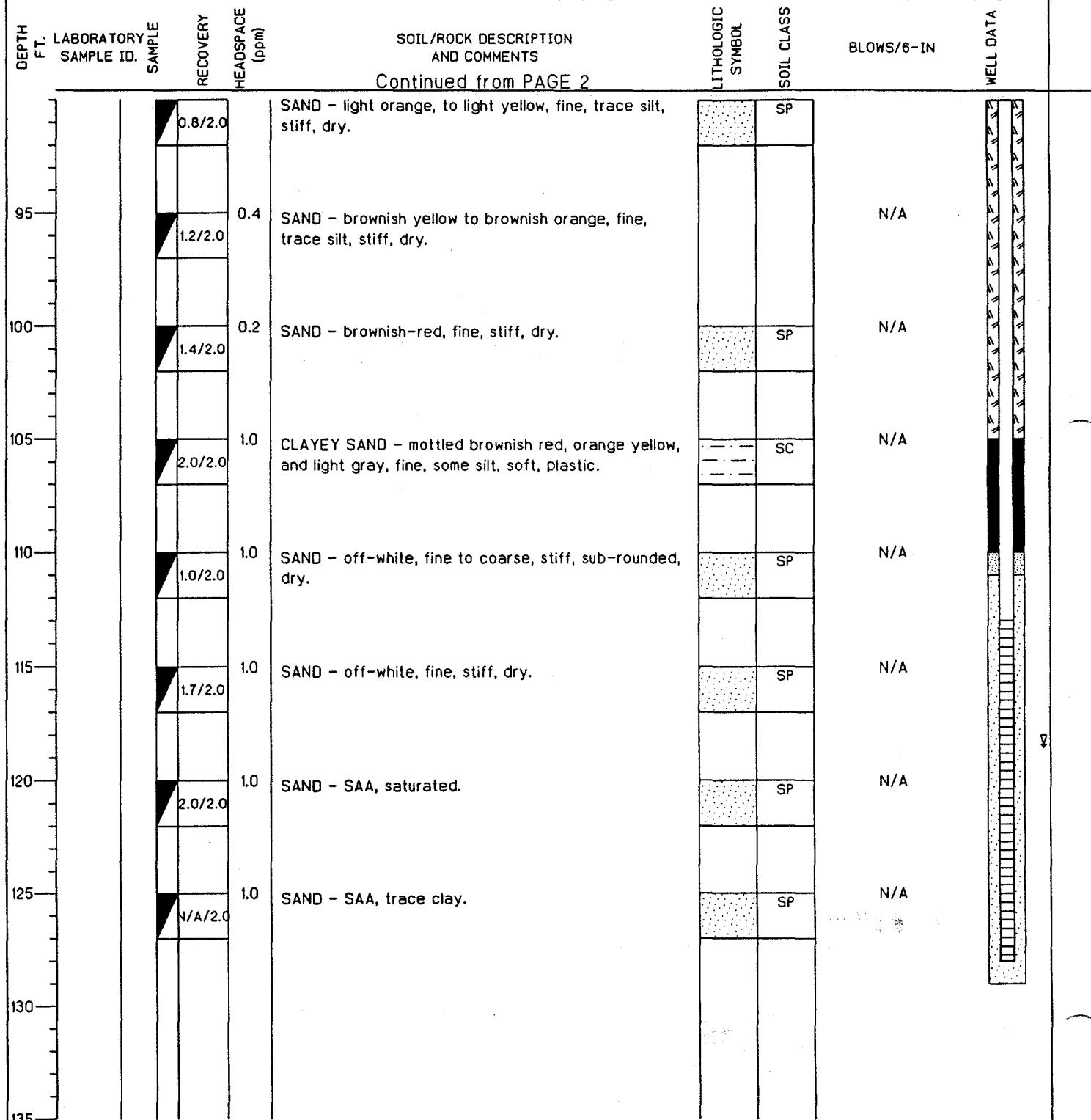


TITLE: Naval Air Station Whiting Field				LOG of WELL: WHF-33-4		BORING NO.			
CLIENT: SOUTHNAVFACENGCOM						PROJECT NO: RI PHASE IIA			
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 6/15/93		COMPLTD: 6/16/93				
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"		SCREEN INT.: 113-128 FT.		PROTECTION LEVEL: D				
TOC ELEV.: 180.56 FT.	MONITOR INST.: OVA		TOT DPTH: 129FT.		DPTH TO ↓ 118.42 FT.				
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:		SITE: 33						
DEPTH FT. LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS			LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5									
10		0	SANDY SILT - brownish red, fine, moderately stiff, very low plasticity , dry.				ML		N/A
15									
20		0	SANDY SILT - SAA.				ML		N/A
25									
30		0	SANDY SILT - light tan, very fine, firm, dry.				ML		N/A
35									
40		0	SAND - light tan to light yellow, fine, interbedded with light pink, firm, dry, 2" lense of clayey sand, light pink, stiff, moderate plasticity, dry.				SP/SC		N/A
45									

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/15/93	COMPLTD: 6/16/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV.: 180.56 FT.	MONITOR INST.: OVA	TOT DPTH: 129FT.	DPTH TO ↓ 118.42 FT.
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:		SITE: 33

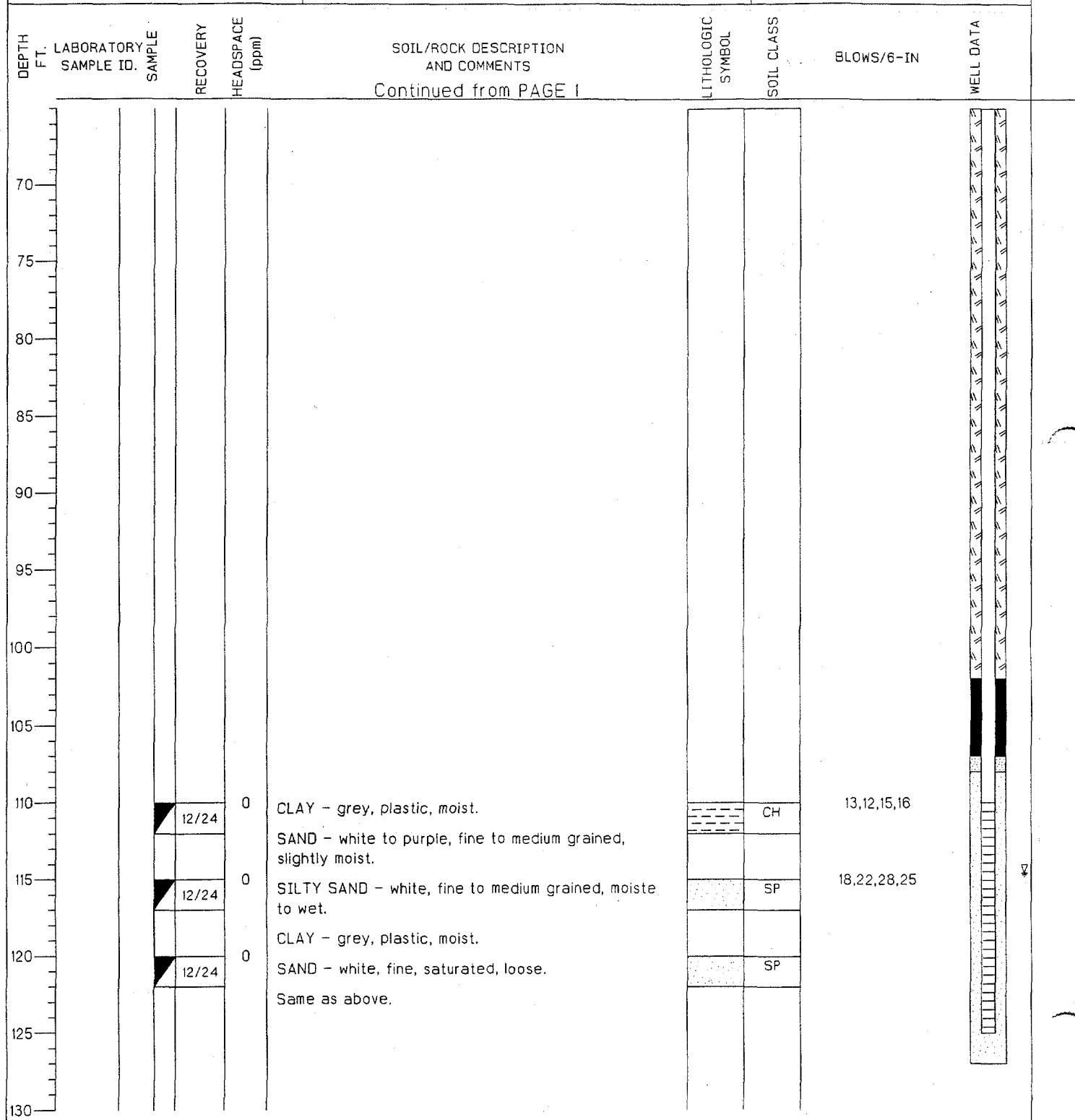
DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
Continued from PAGE 1								
50		1.6/2.0	0	SANDY SILT - light tan to light yellow, very fine, some sand, firm, dry.		ML		N/A
55								
60		1.8/2.0	0	SANDY SILT - SAA, off-white, trace clay.		ML		N/A
65								
70		2.0/2.0	0	SILTY CLAY (1') - light gray, mottled brown, purple and light orange, plastic, moderately stiff. FAT CLAY (1') - SAA.	~ ~ ~	OH/CL		N/A
		1.8/2.0	N/A	FAT CLAY (1.5') - SAA. SILTY CLAY (0.3') - SAA.	~ ~ ~			N/A
75					~ ~ ~			
80		1.7/2.0	0	SAND - light brown, fine, some silt, dry. CLAY - light brown, plastic soft. SAND - off-white, fine, trace silt, stiff, dry.		SP/CL/SP		N/A
85		1.4/2.0	1	SAND - light yellow, fine, interbedded off-white and light pink, stiff, dry.		SP		N/A
90			0.8			SP		N/A

TITLE: Naval Air Station Whiting Field		LOG of WELL: WHF-33-4	BORING NO.
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: RI PHASE IIA
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 6/15/93	COMPLTD: 6/16/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 113-128 FT.	PROTECTION LEVEL: D
TOC ELEV.: 180.56 FT.	MONITOR INST.: OVA	TOT DPTH: 129FT.	DPTH TO ↓ 118.42 FT.
LOGGED BY: D. WONG	WELL DEVELOPMENT DATE:		SITE: 33



TITLE: Naval Air Station Whiting Field			LOG of WELL: WHF-33-5		BORING NO.		
CLIENT: SOUTHNAVFACENGCOM					PROJECT NO: RI PHASE IIA		
CONTRACTOR: Groundwater Protection Inc.			DATE STARTED: 5/21/93	COMPLTD: 5/21/93			
METHOD: HOLLOW STEM AUGER		CASE SIZE: 2"	SCREEN INT.: 110-125 FT.	PROTECTION LEVEL: D			
TOC ELEV.: 178.7 FT.		MONITOR INST.: FID	TOT DPTH: 125FT.	DPTH TO $\frac{1}{2}$ 114.59 FT.			
LOGGED BY: G. Kanchibhatla		WELL DEVELOPMENT DATE:		SITE: 33			
DEPTH FT. LABORATORY SAMPLE ID.	SAMPLE	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5							
10			SEE WHF-33-2 FOR LITHOLOGIC DATA.				
15							
20							
25							
30							
35							
40							
45							
50							
55							
60							
65							

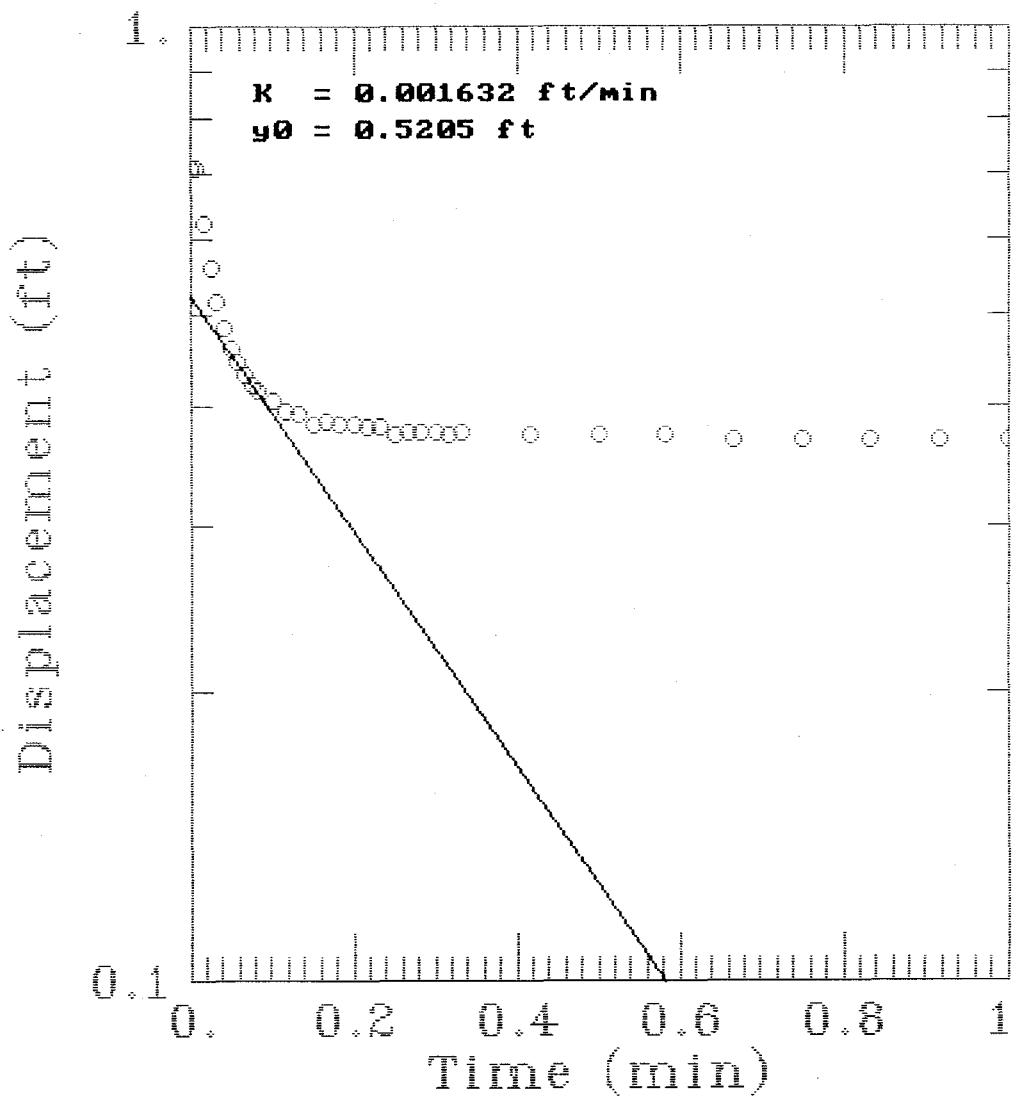
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CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: RI PHASE IIA	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 5/21/93	COMPLTD: 5/21/93
METHOD: HOLLOW STEM AUGER	CASE SIZE: 2"	SCREEN INT.: 110-125 FT.	PROTECTION LEVEL: D
TOC ELEV.: 178.7 FT.	MONITOR INST.: FID	TOT DPTH: 125FT.	DPTH TO \neq 114.59 FT.
LOGGED BY: G. Kanchibhatla	WELL DEVELOPMENT DATE:		SITE: 33



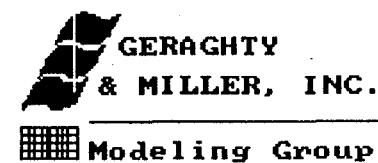
APPENDIX B

INDIVIDUAL SLUG TEST RESULTS

WHF-BKG-2 RUN #1

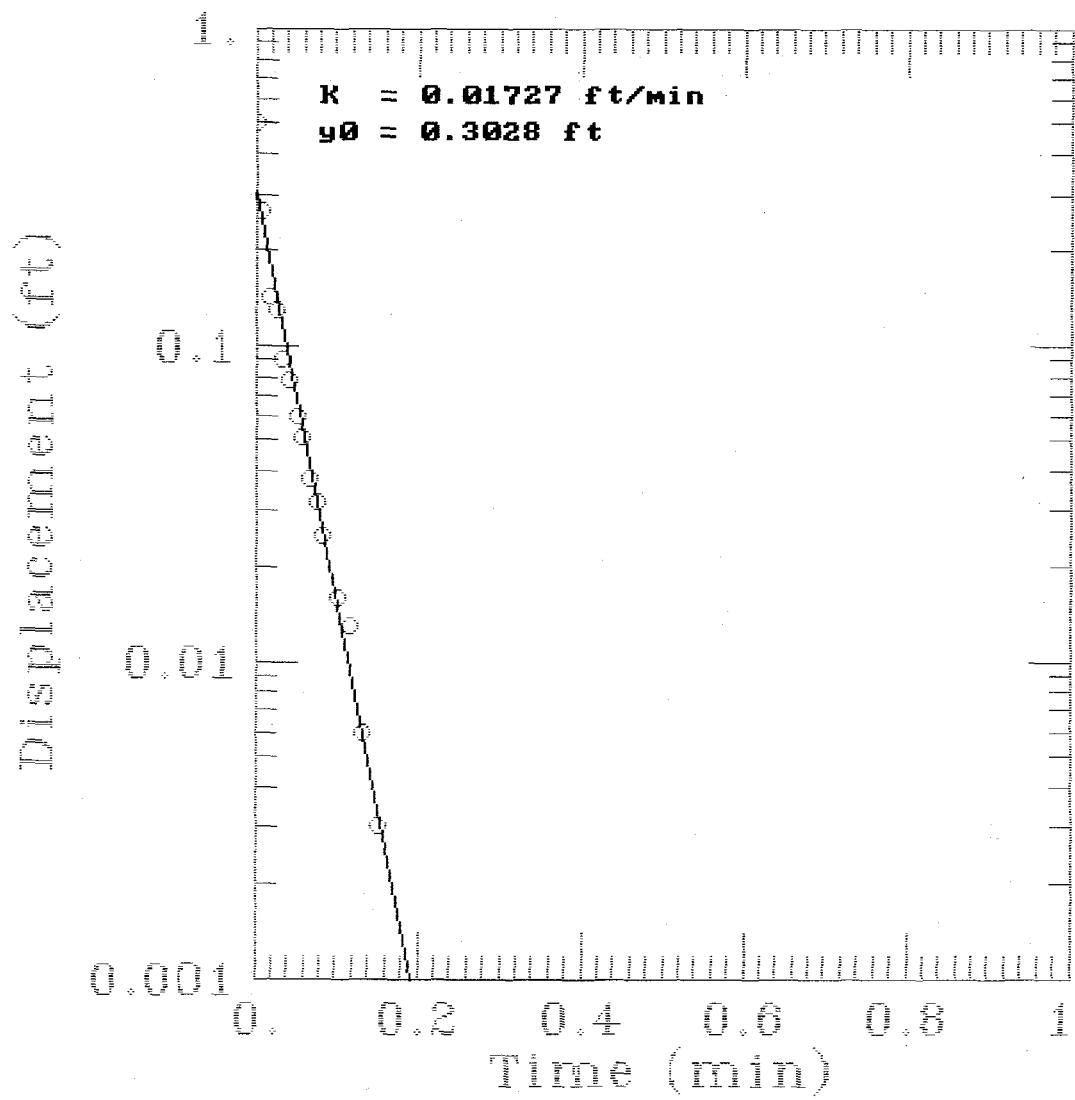


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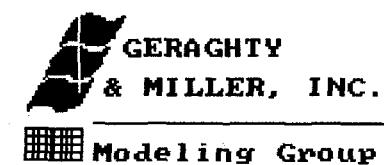


Modeling Group

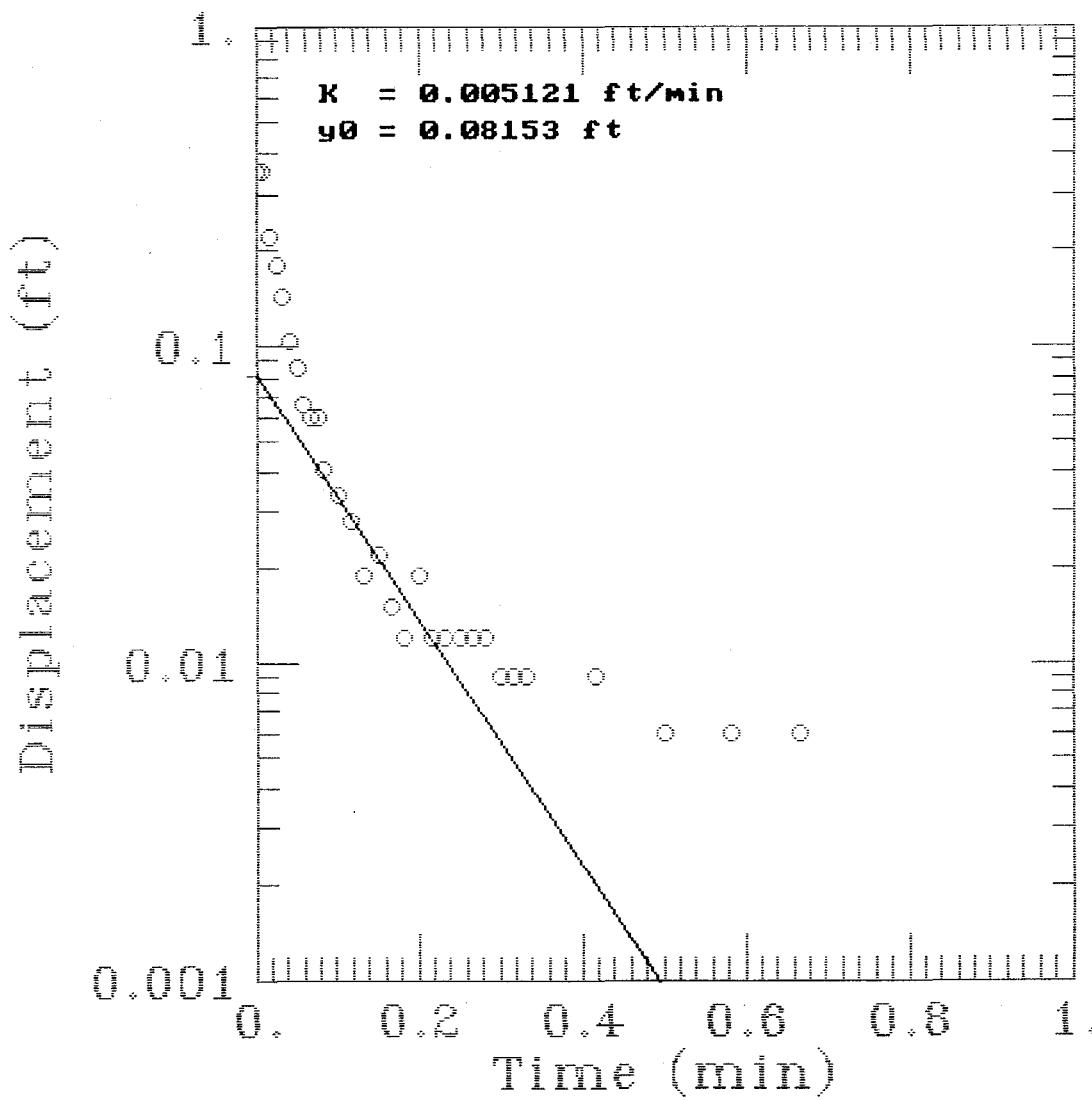
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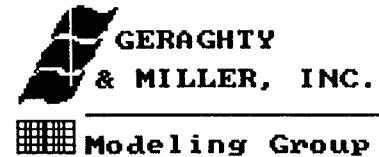
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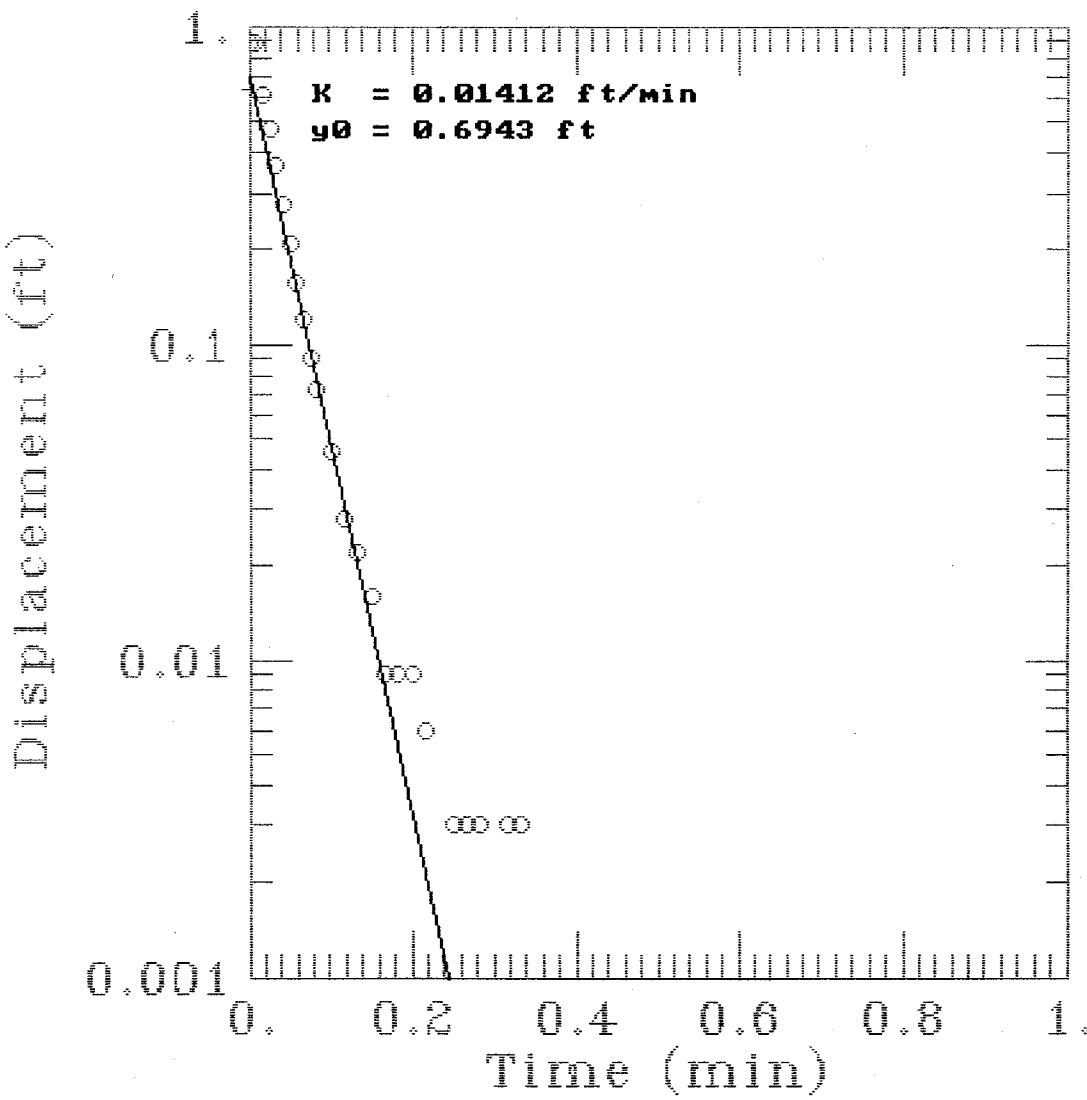


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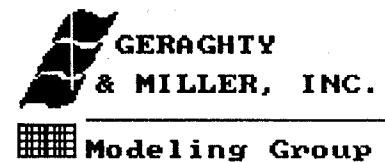


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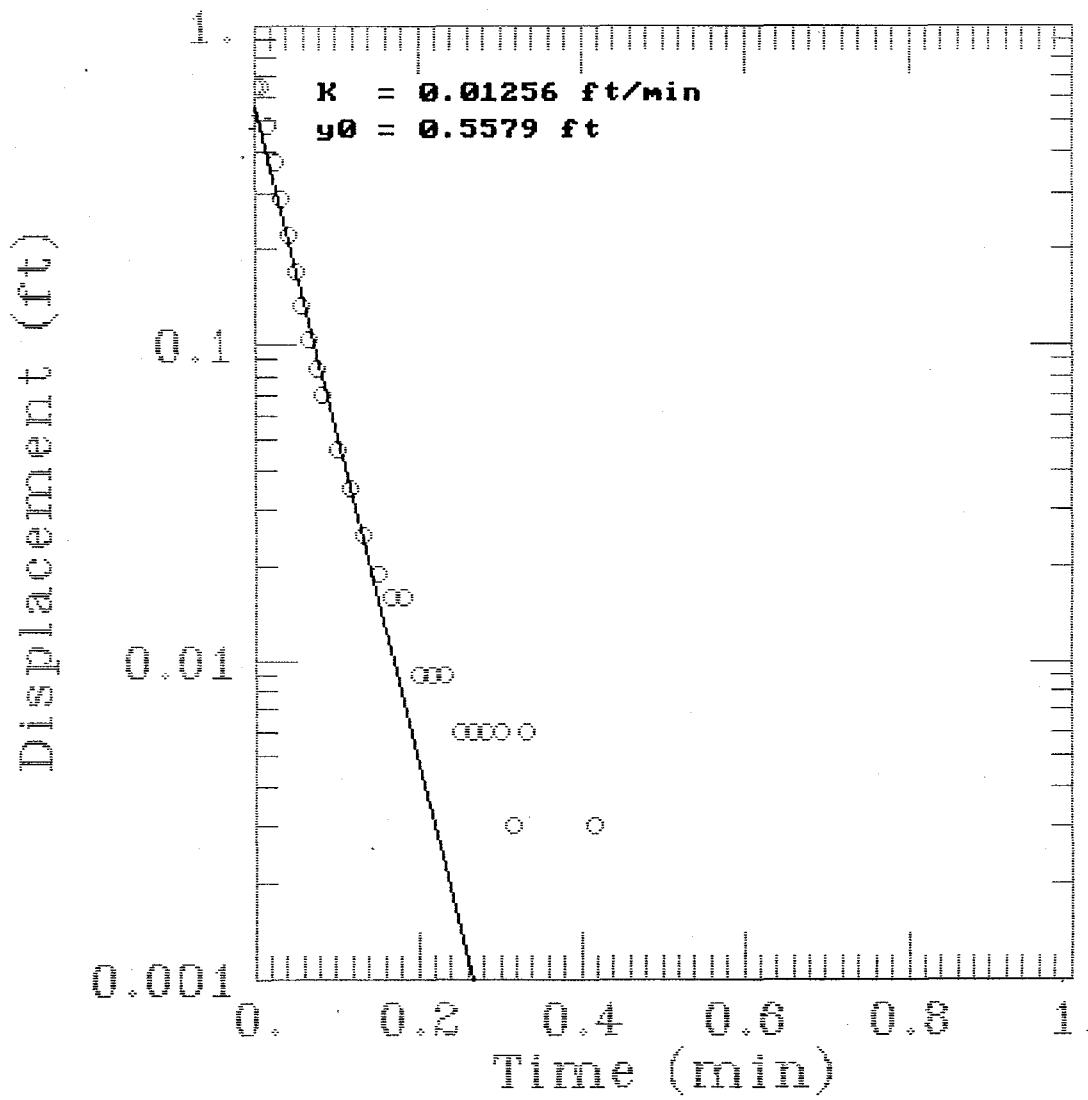
WHF-1-1S RUN #1



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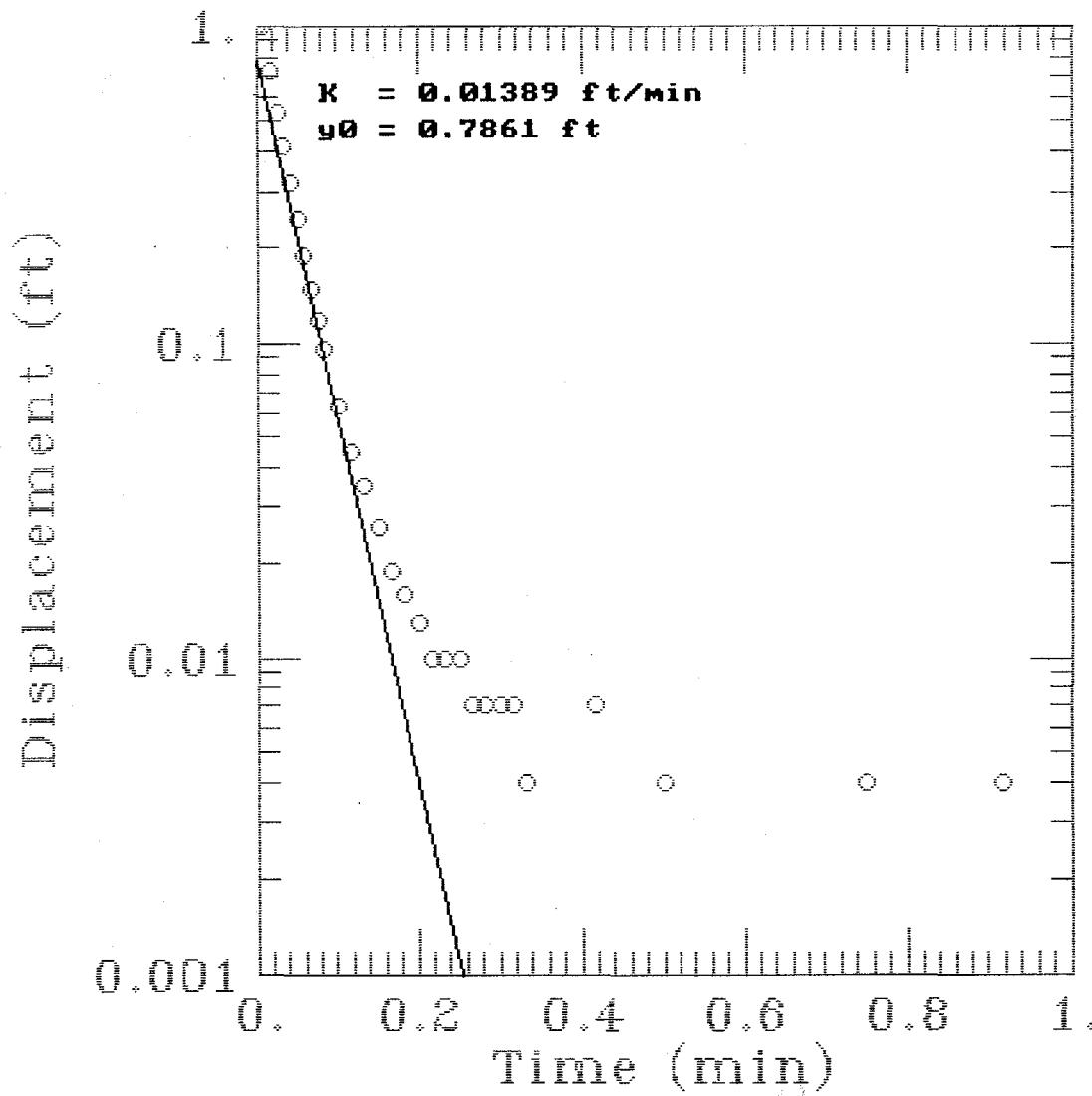


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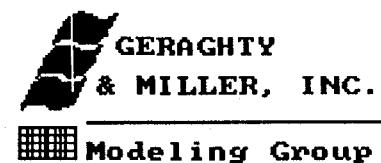


Modeling Group

WHF-1-1S RUN #3

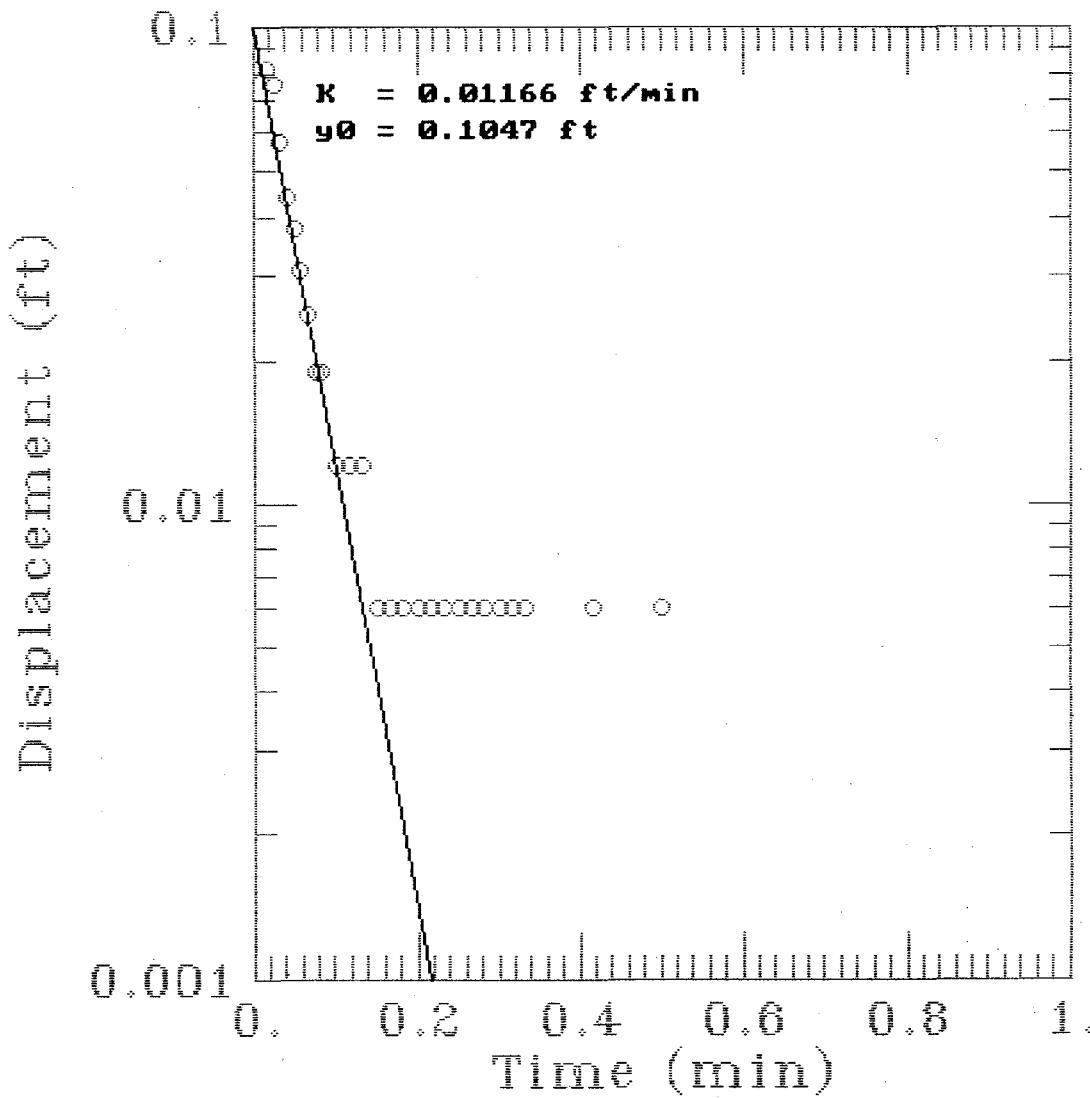


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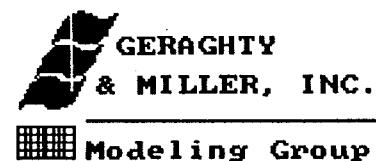


Modeling Group

WHF-2-1 RUN #1

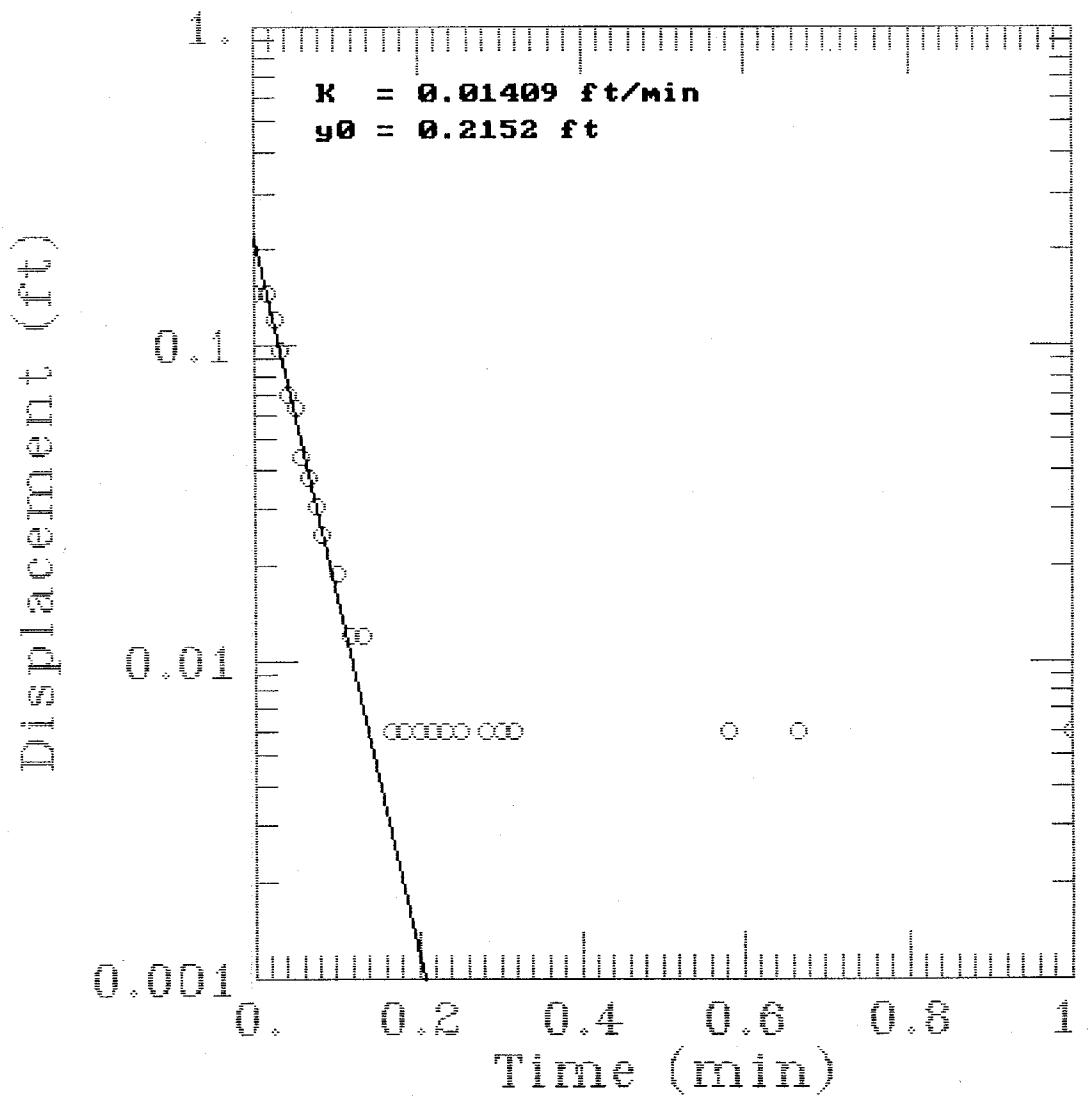


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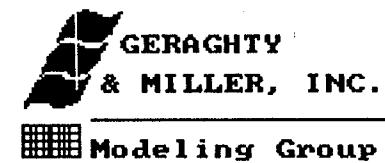


Modeling Group

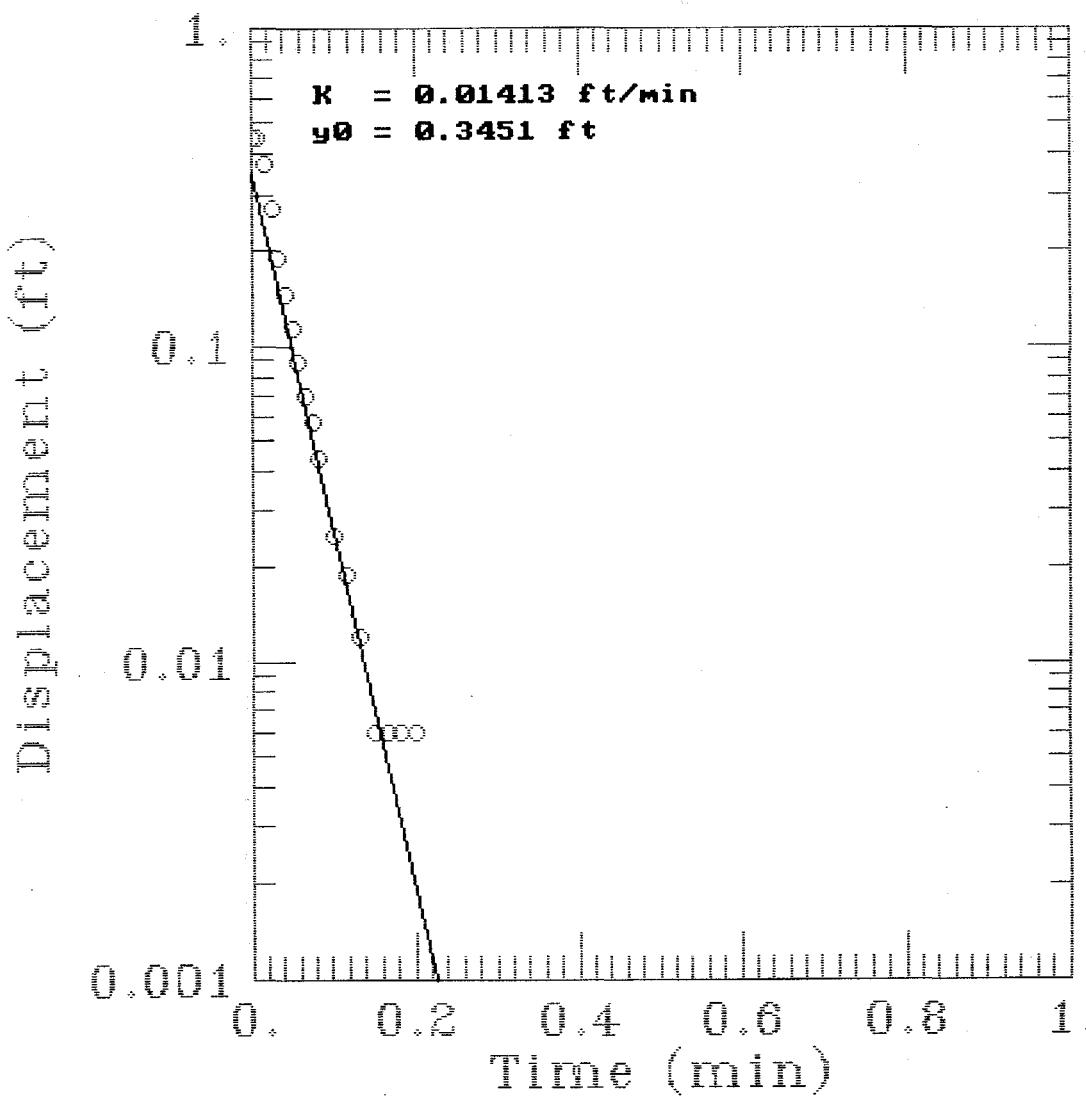
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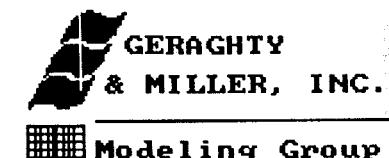
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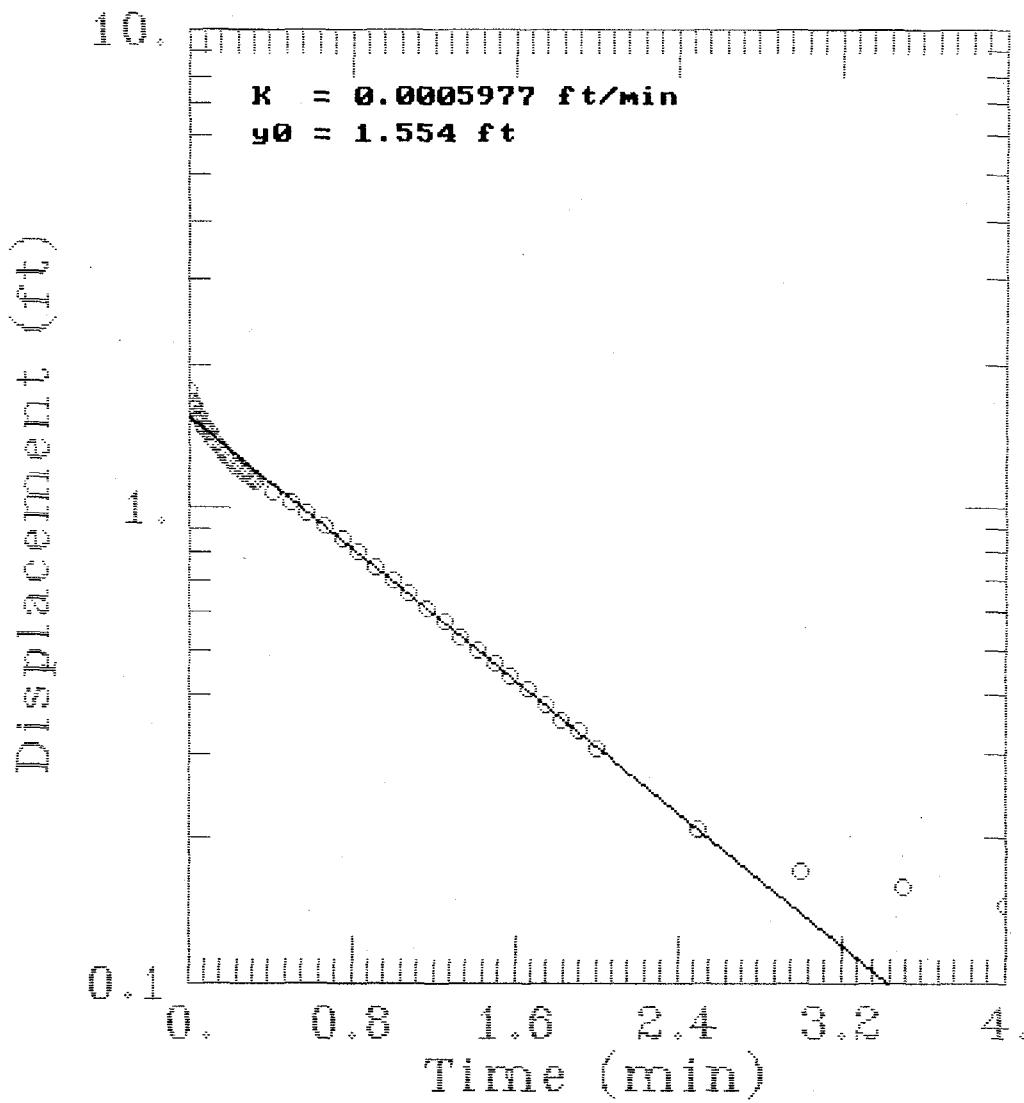


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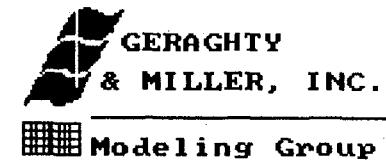


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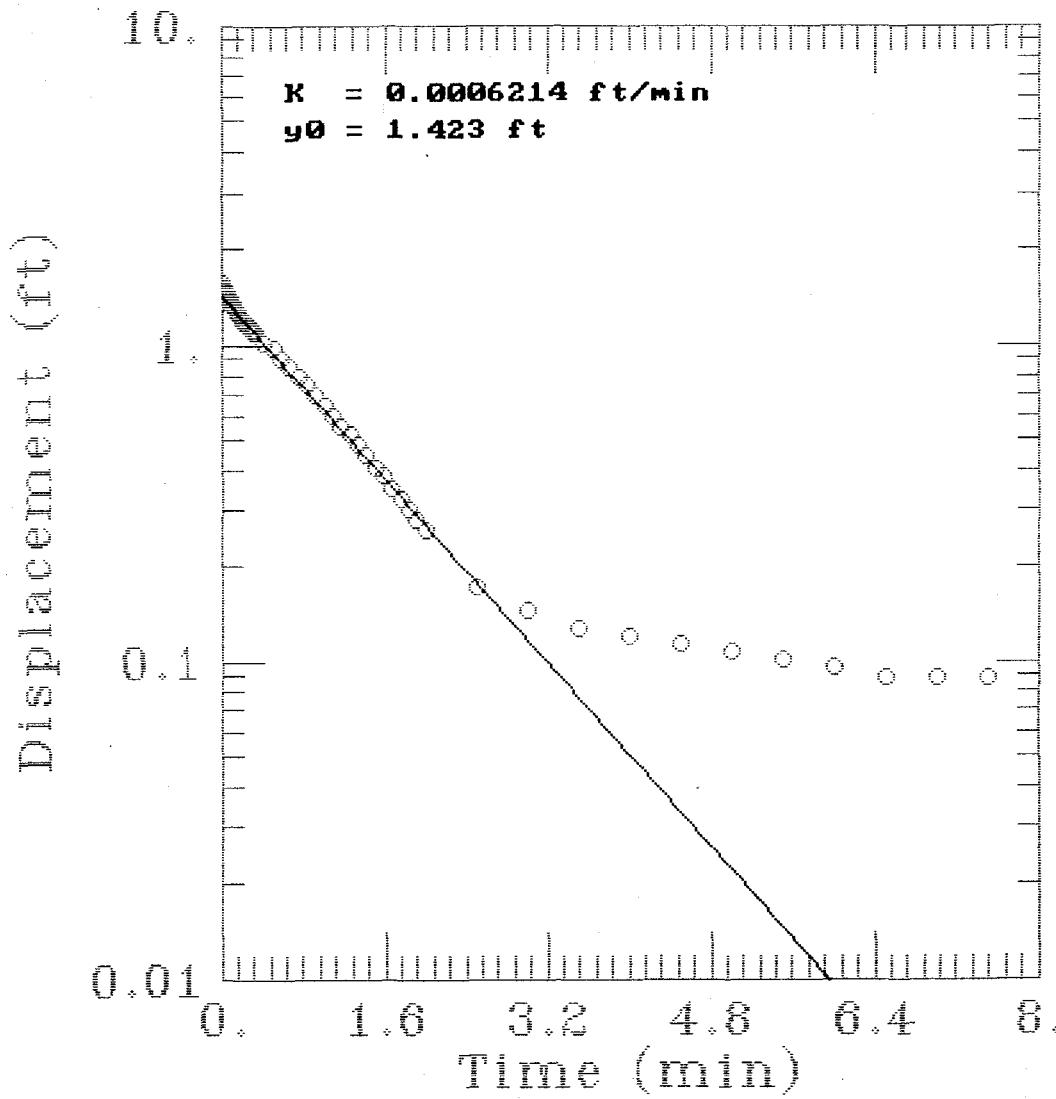
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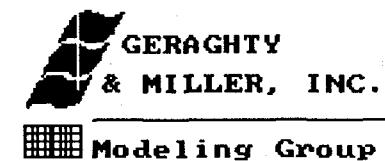
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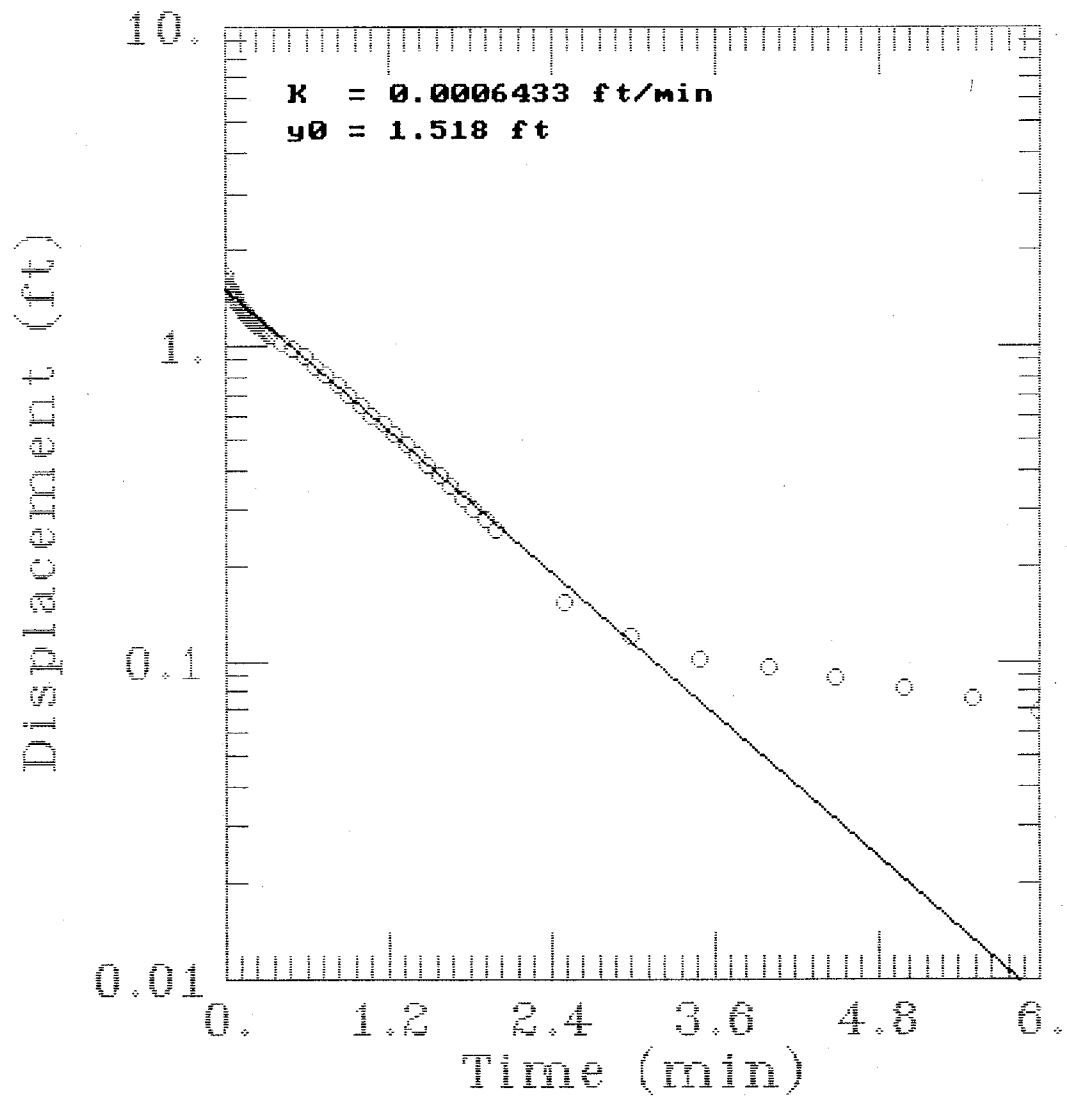
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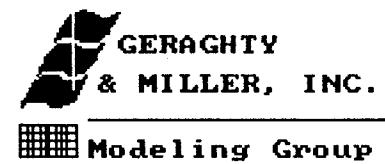
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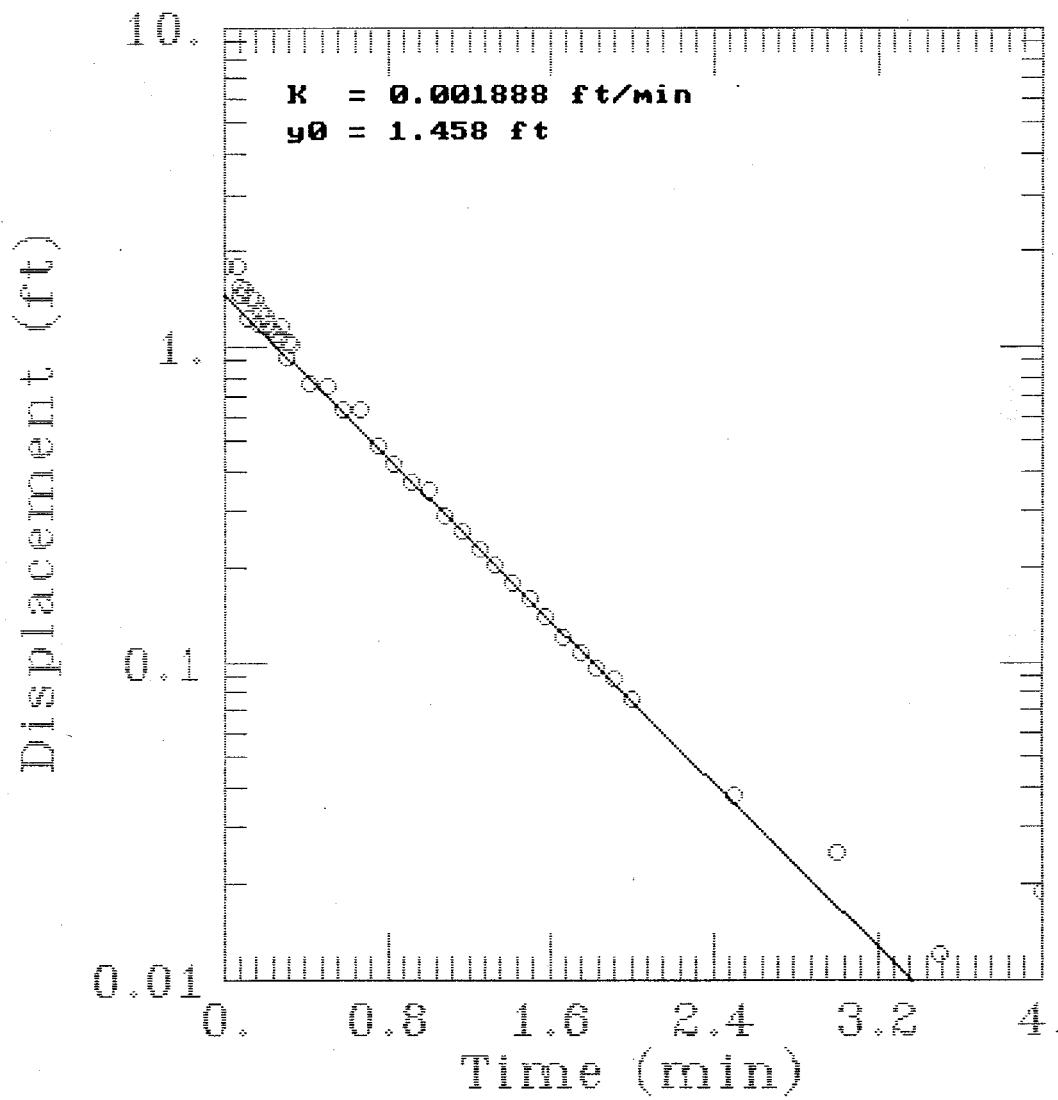


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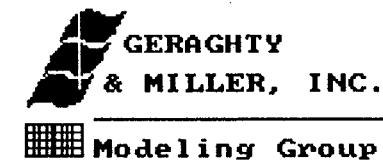


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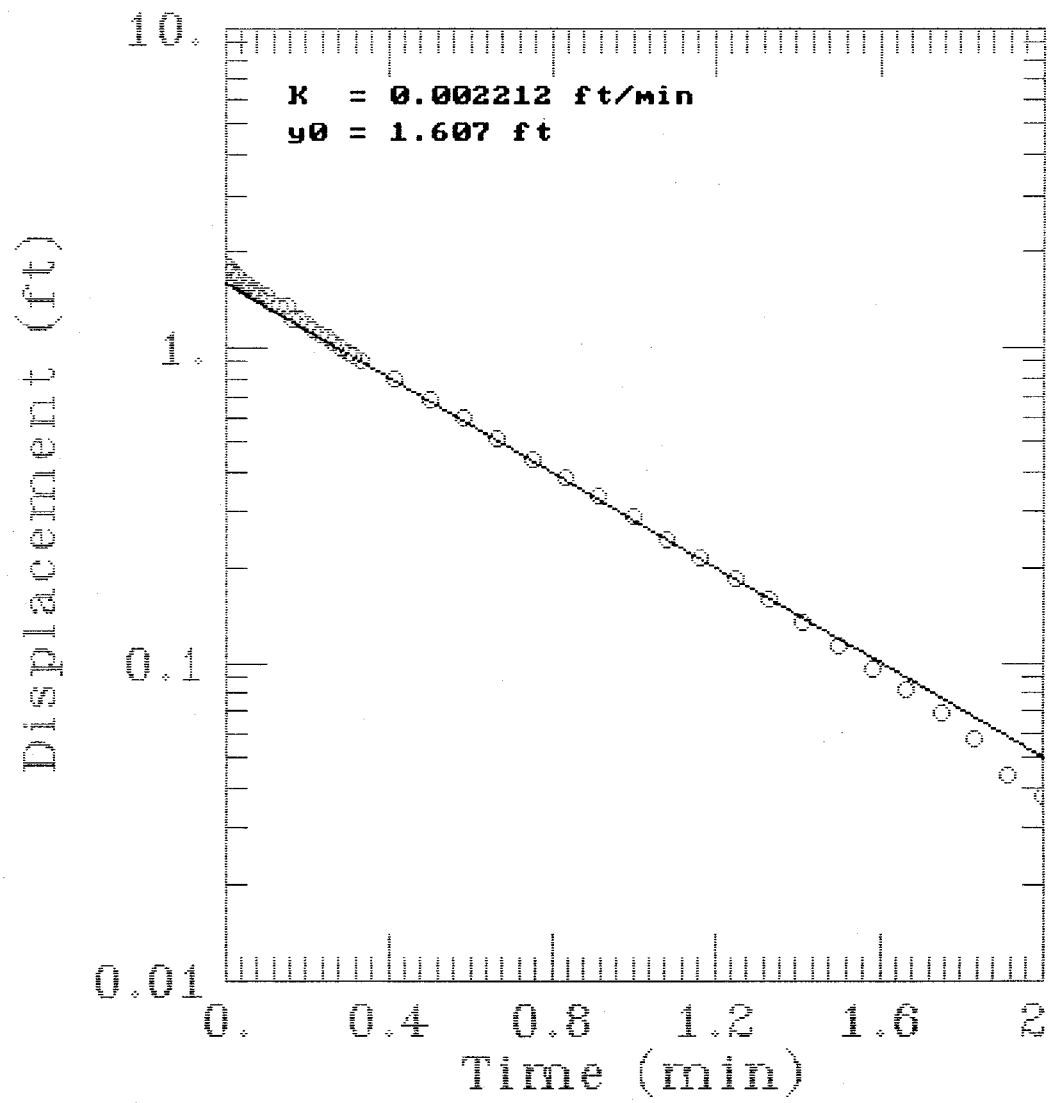
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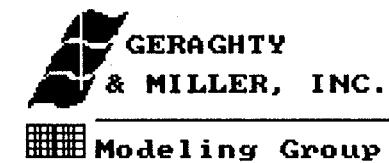
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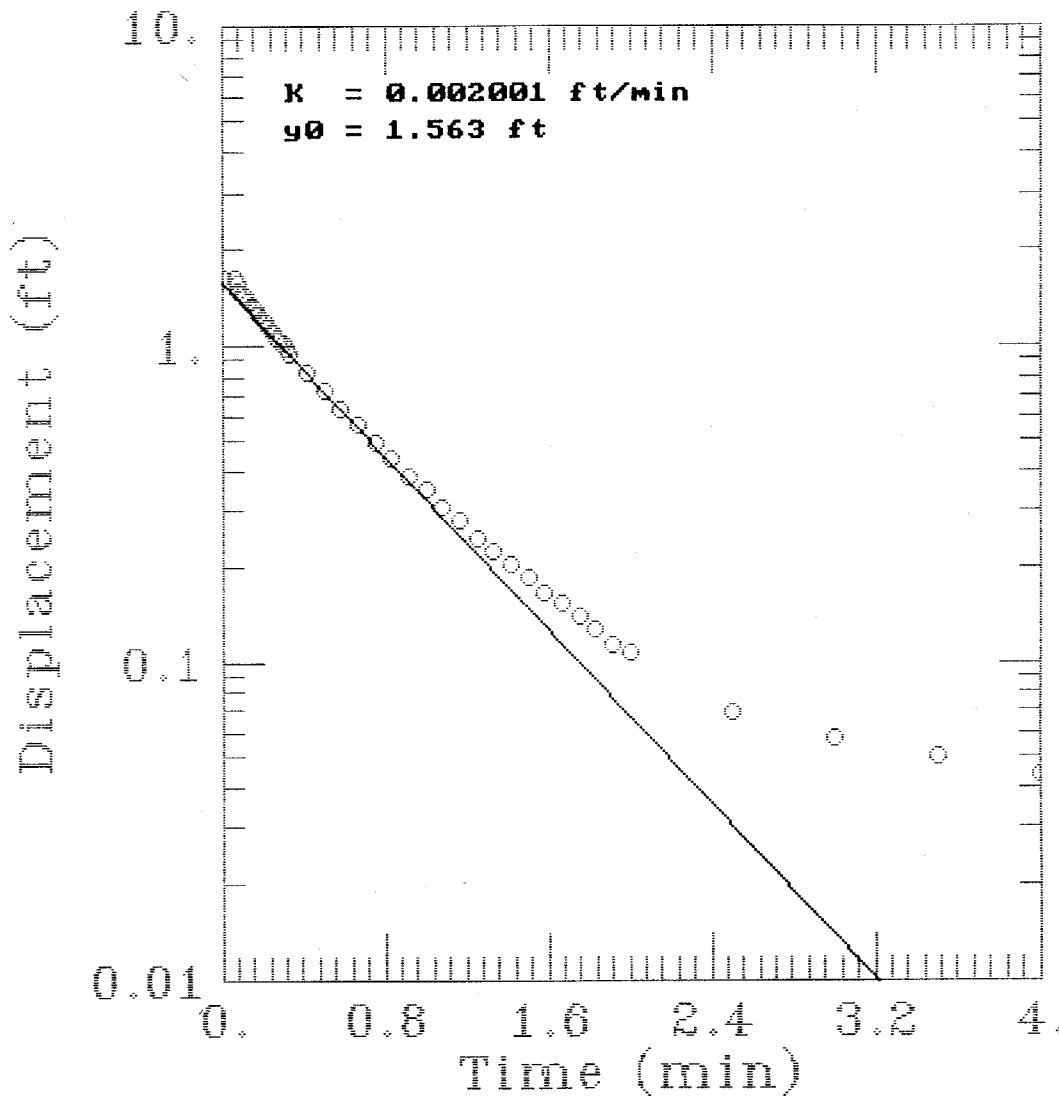
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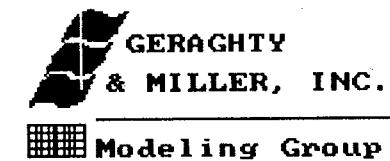
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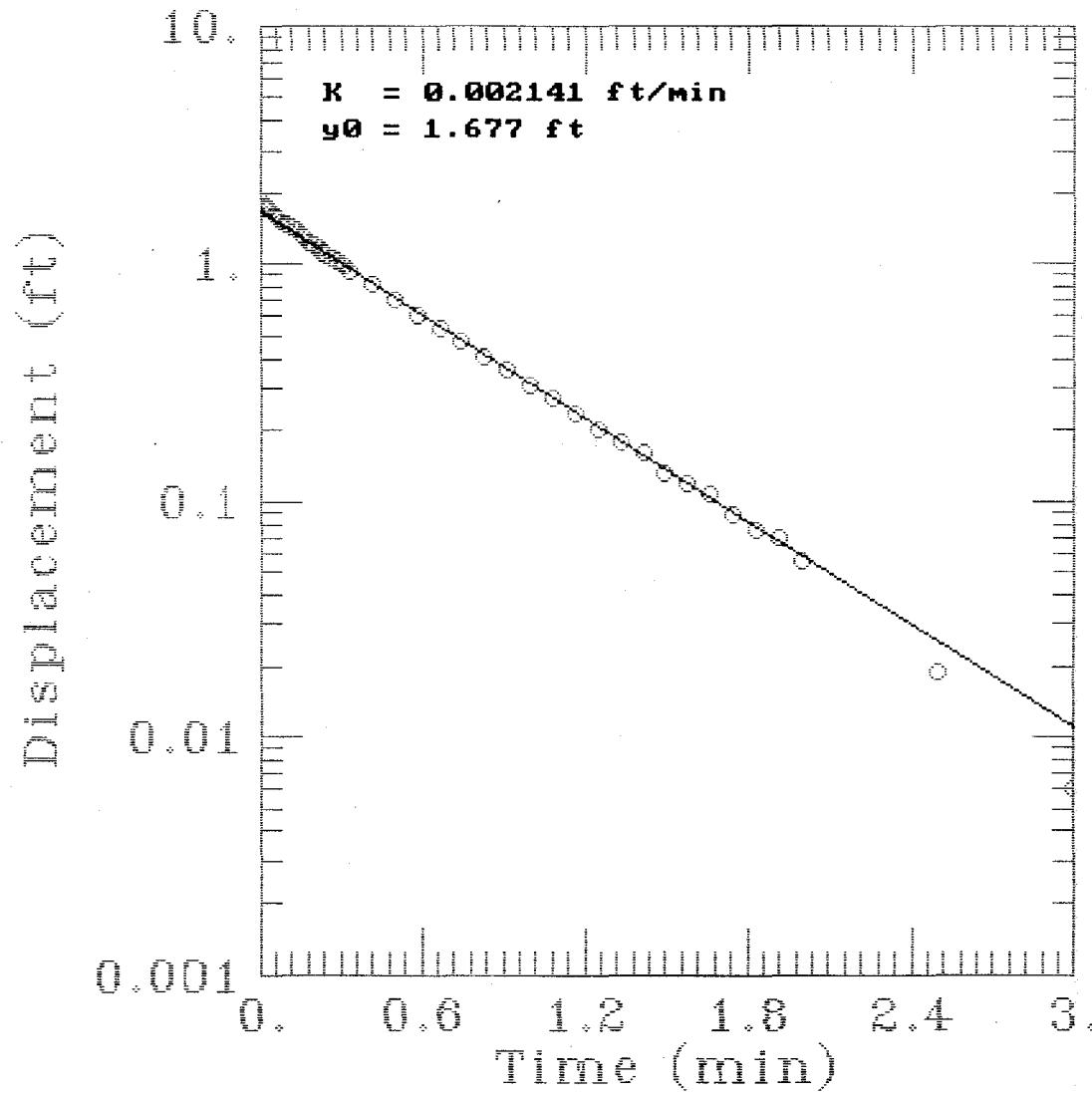
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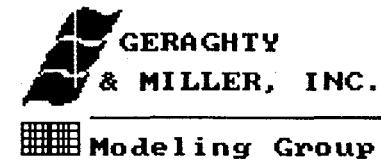
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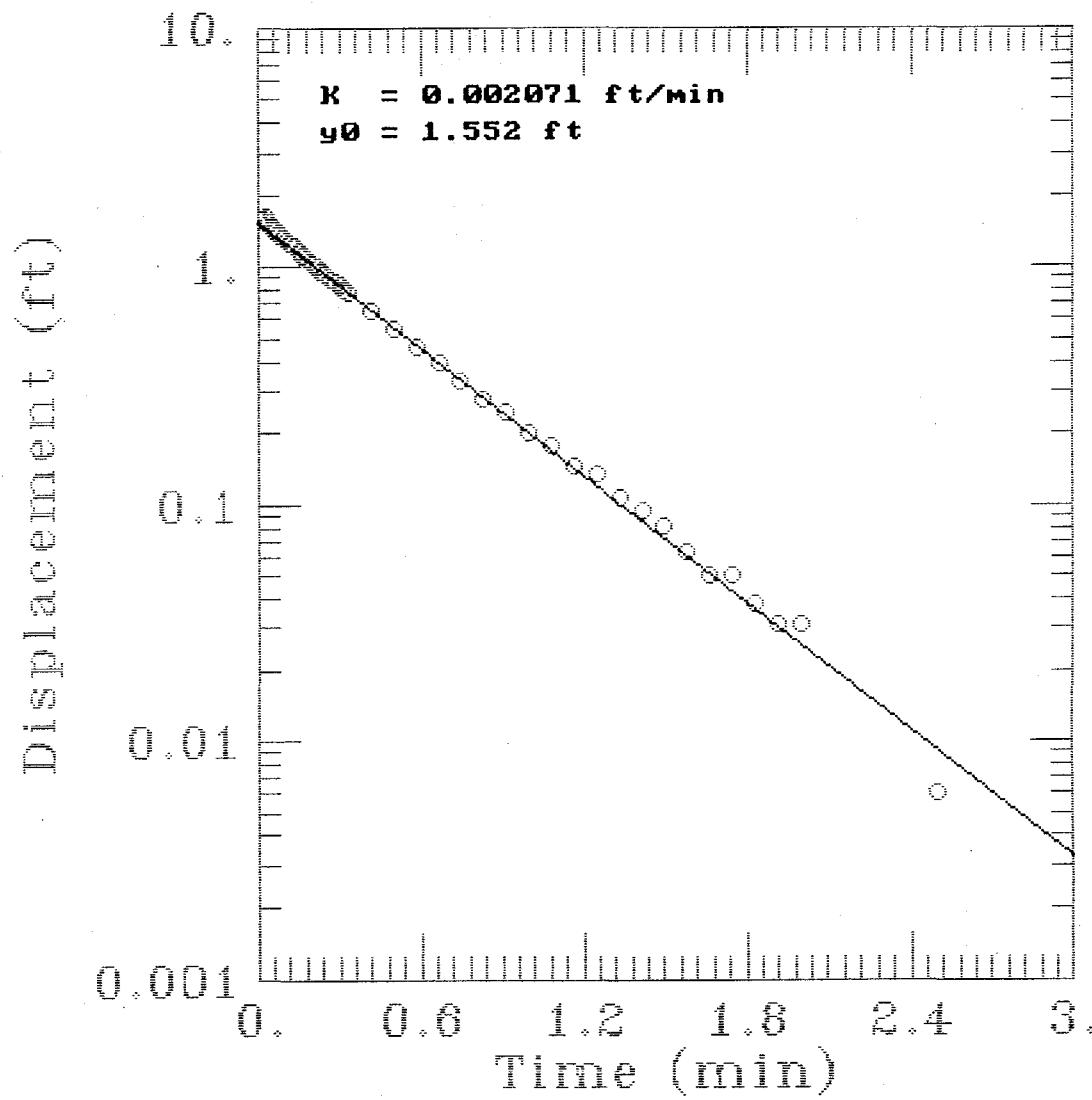


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Modeling Group

WHF-3-7S RUN #1



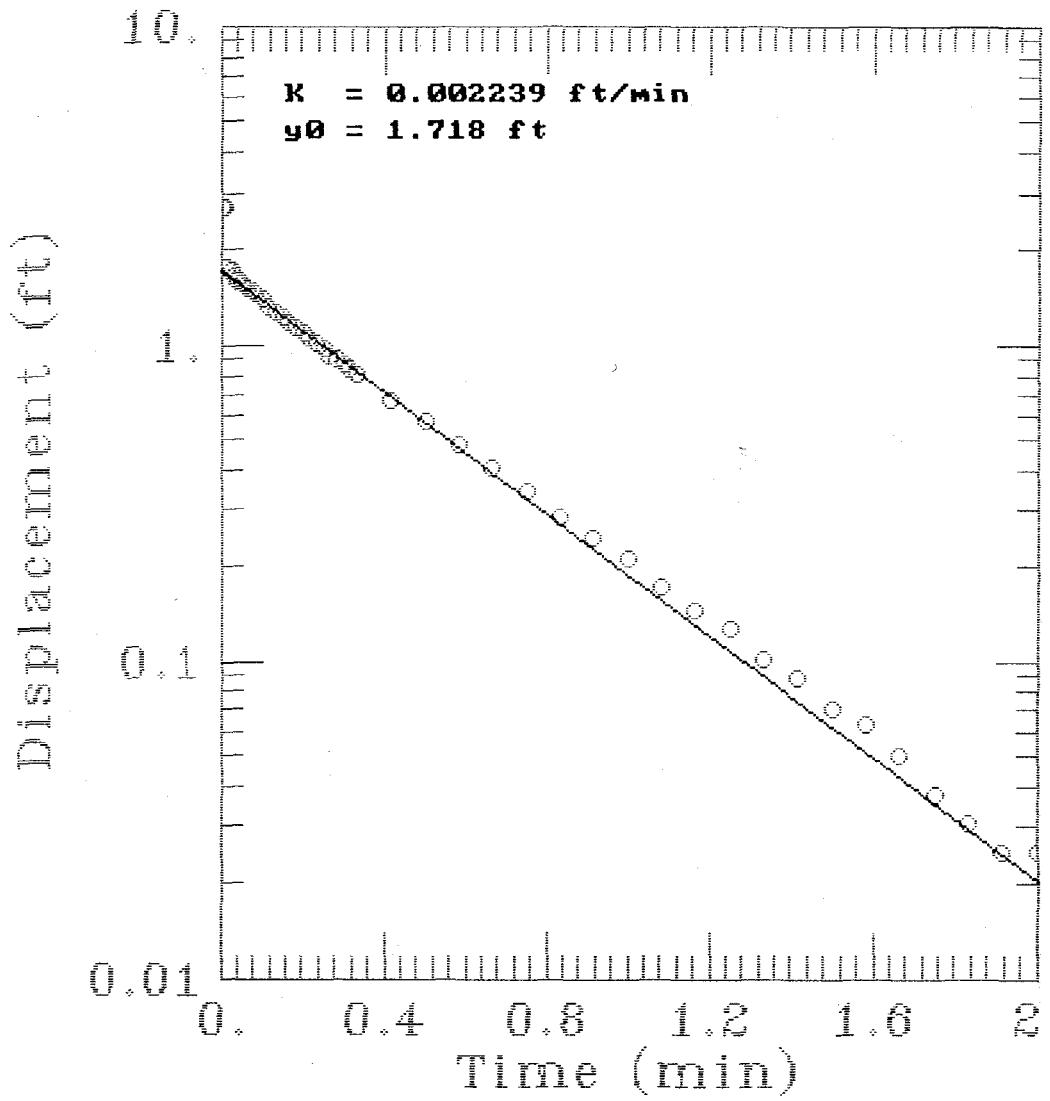
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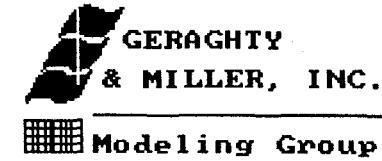
GERAGHTY
& MILLER, INC.

Modeling Group

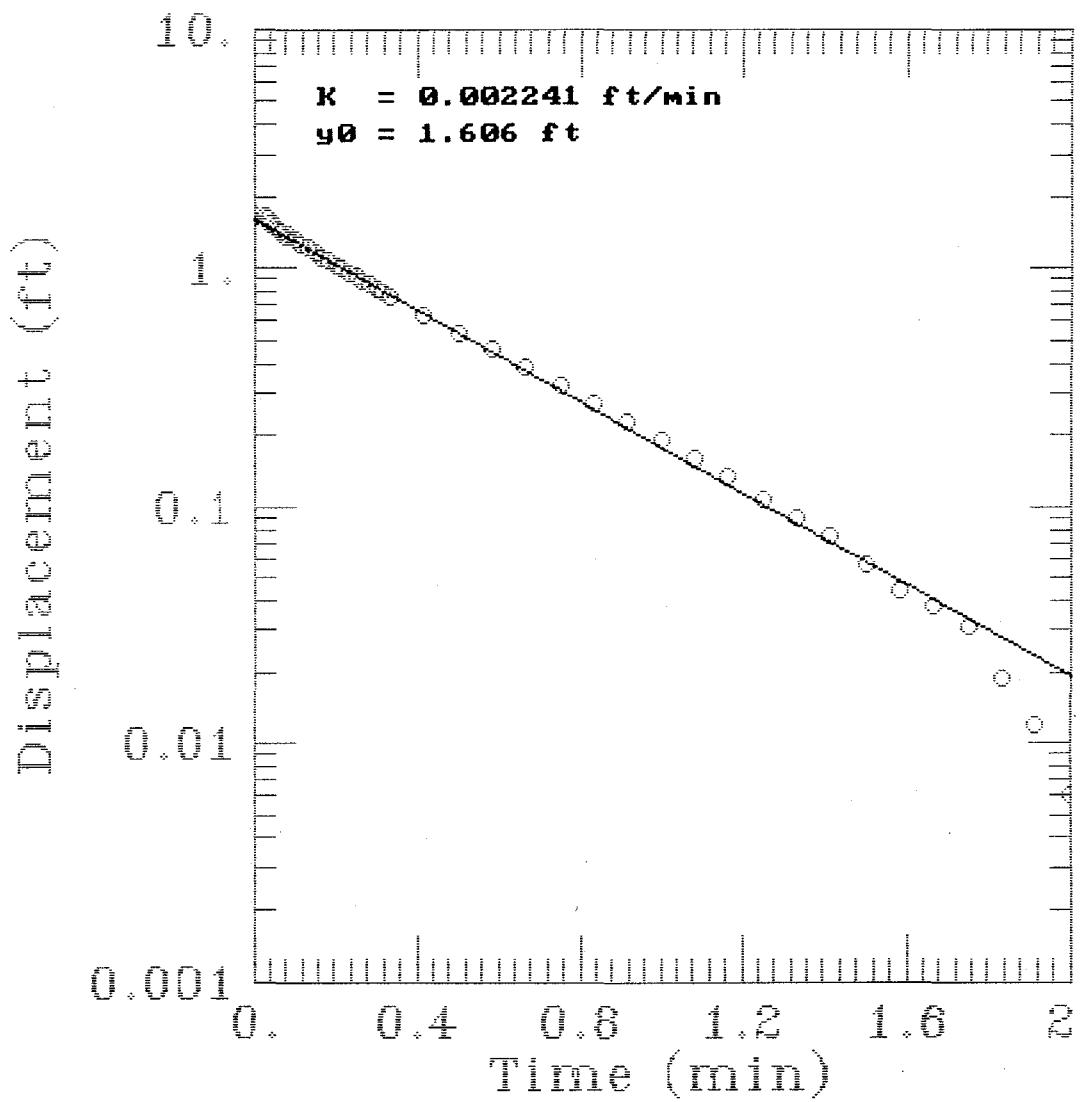
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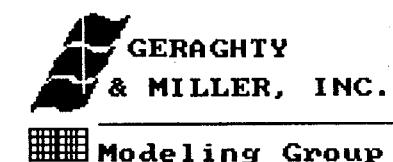
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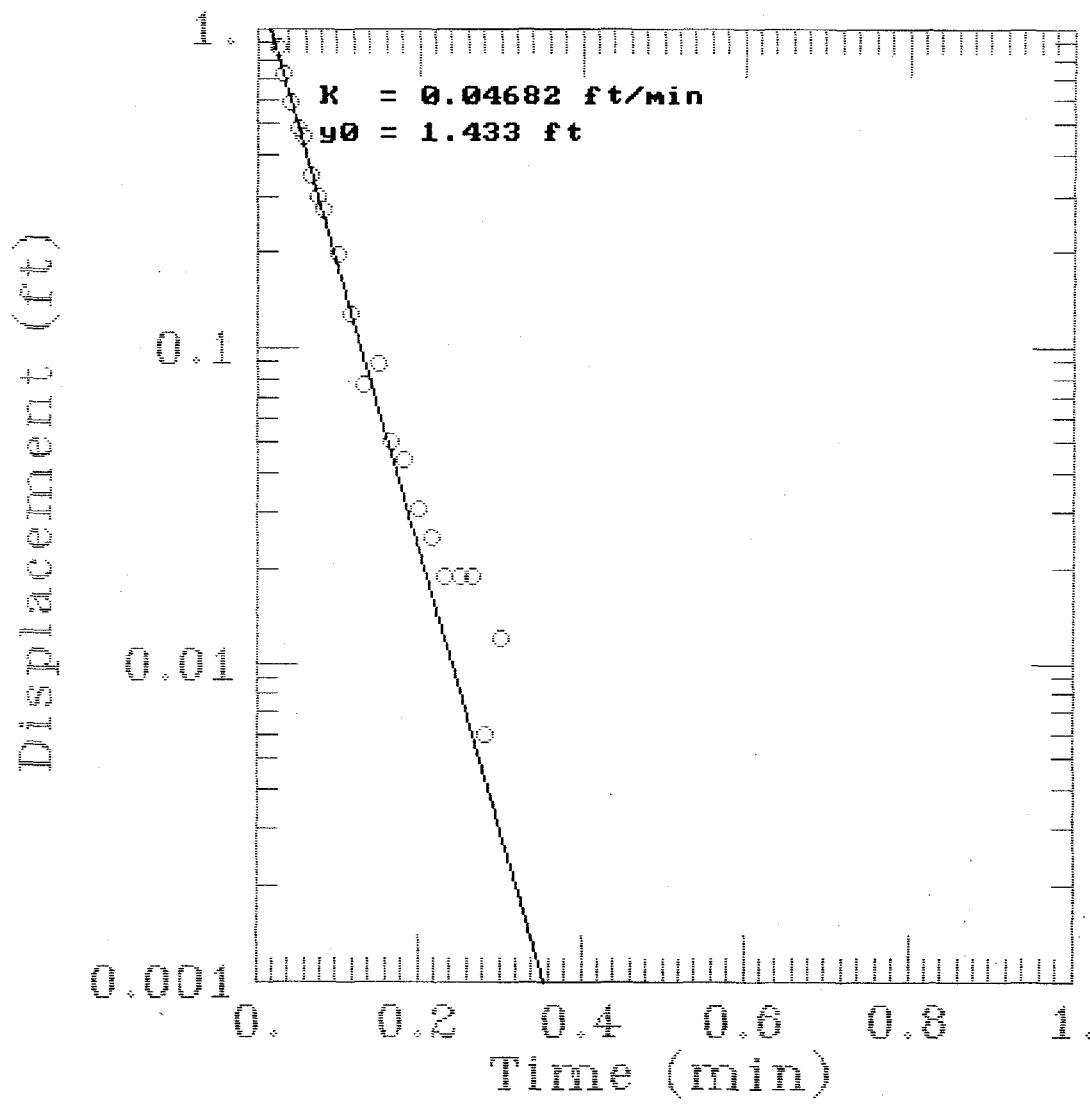
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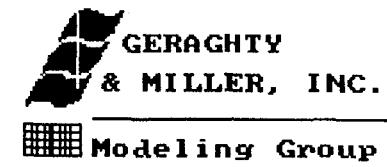
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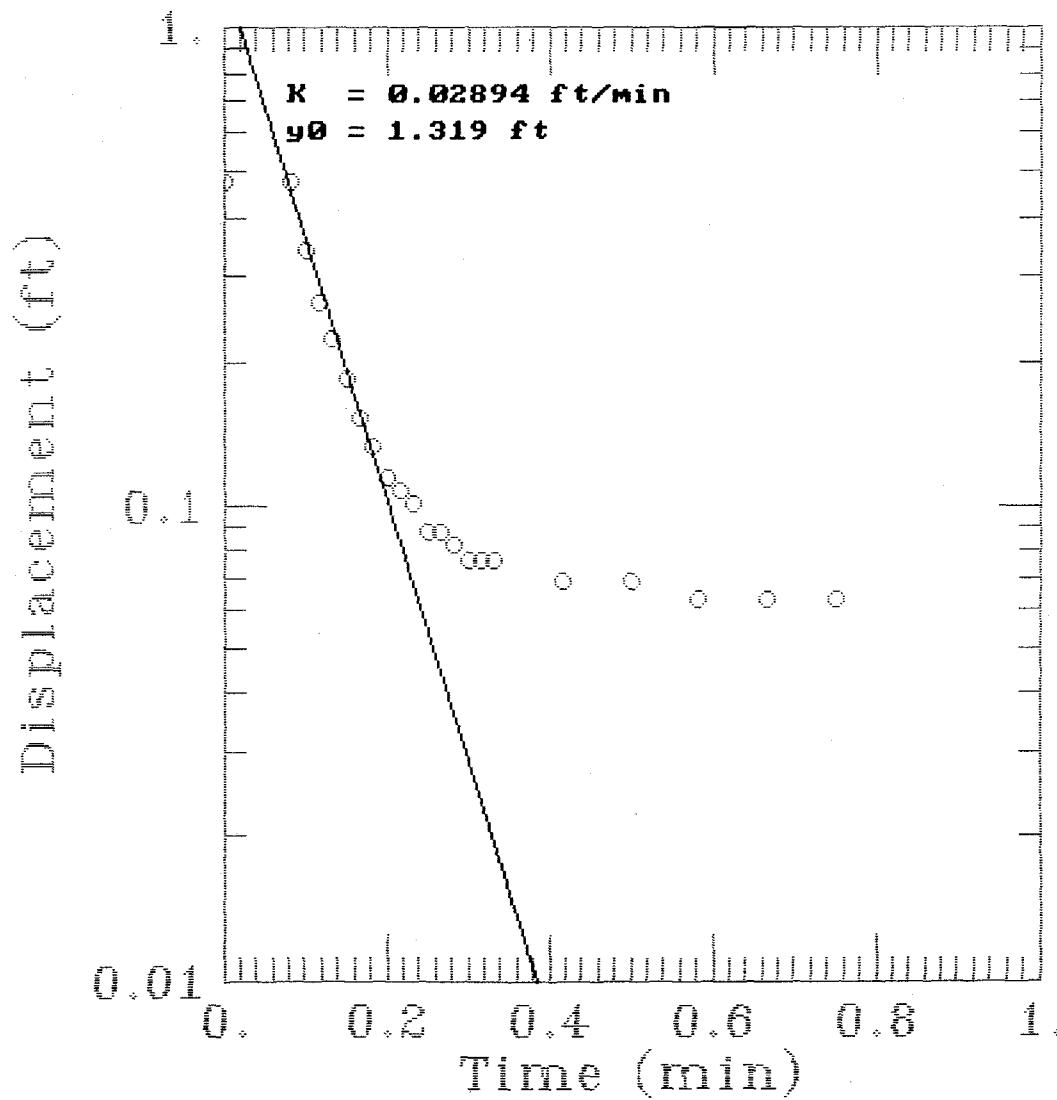
WHF-3-7D RUN #1



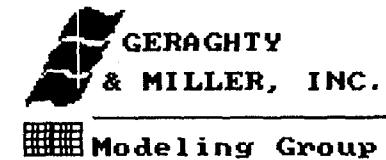
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WHF-3-7D RUN #2



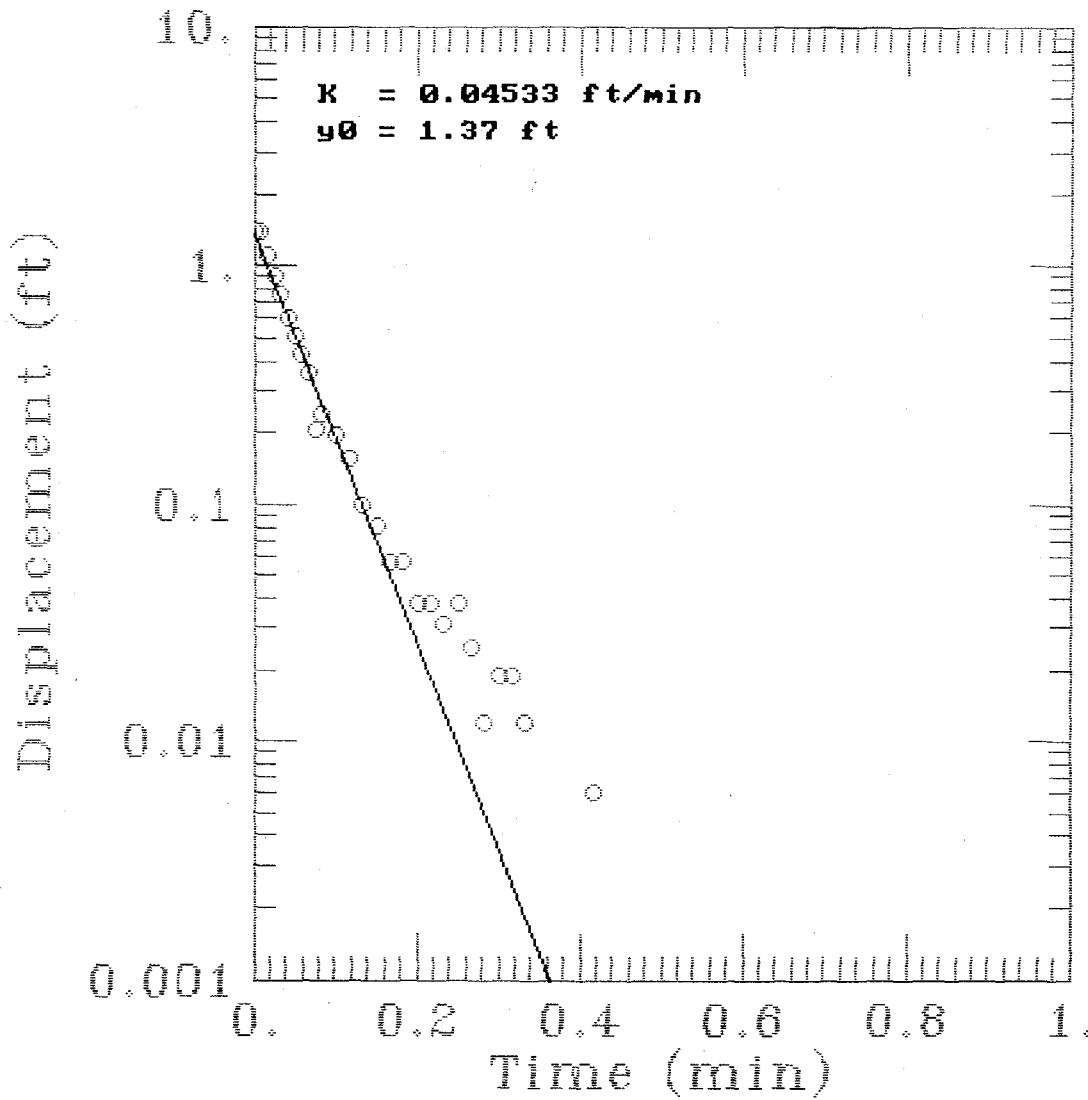
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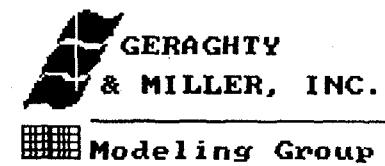
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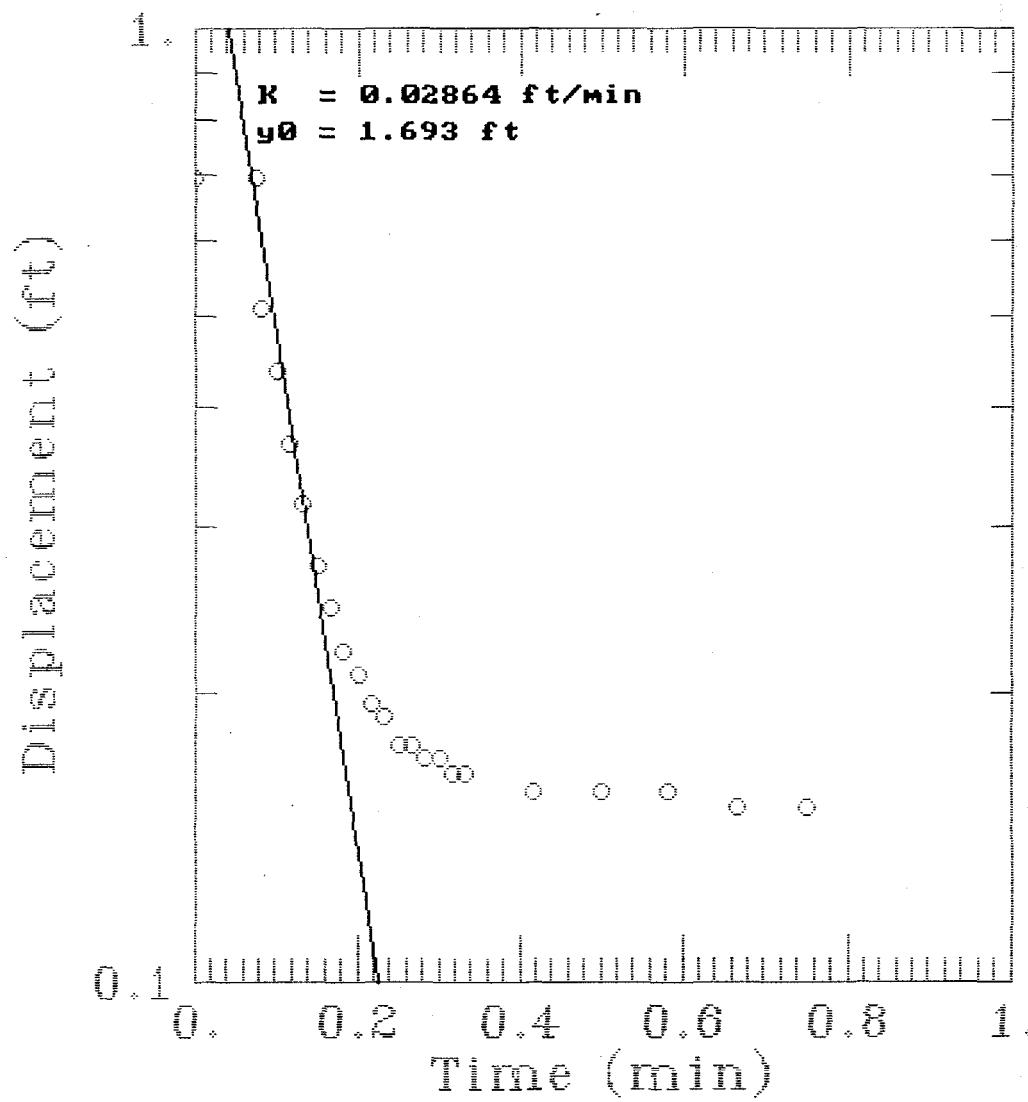
WHF-3-7D RUN #3



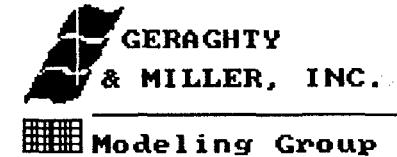
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WHF-3-7D RUN #4

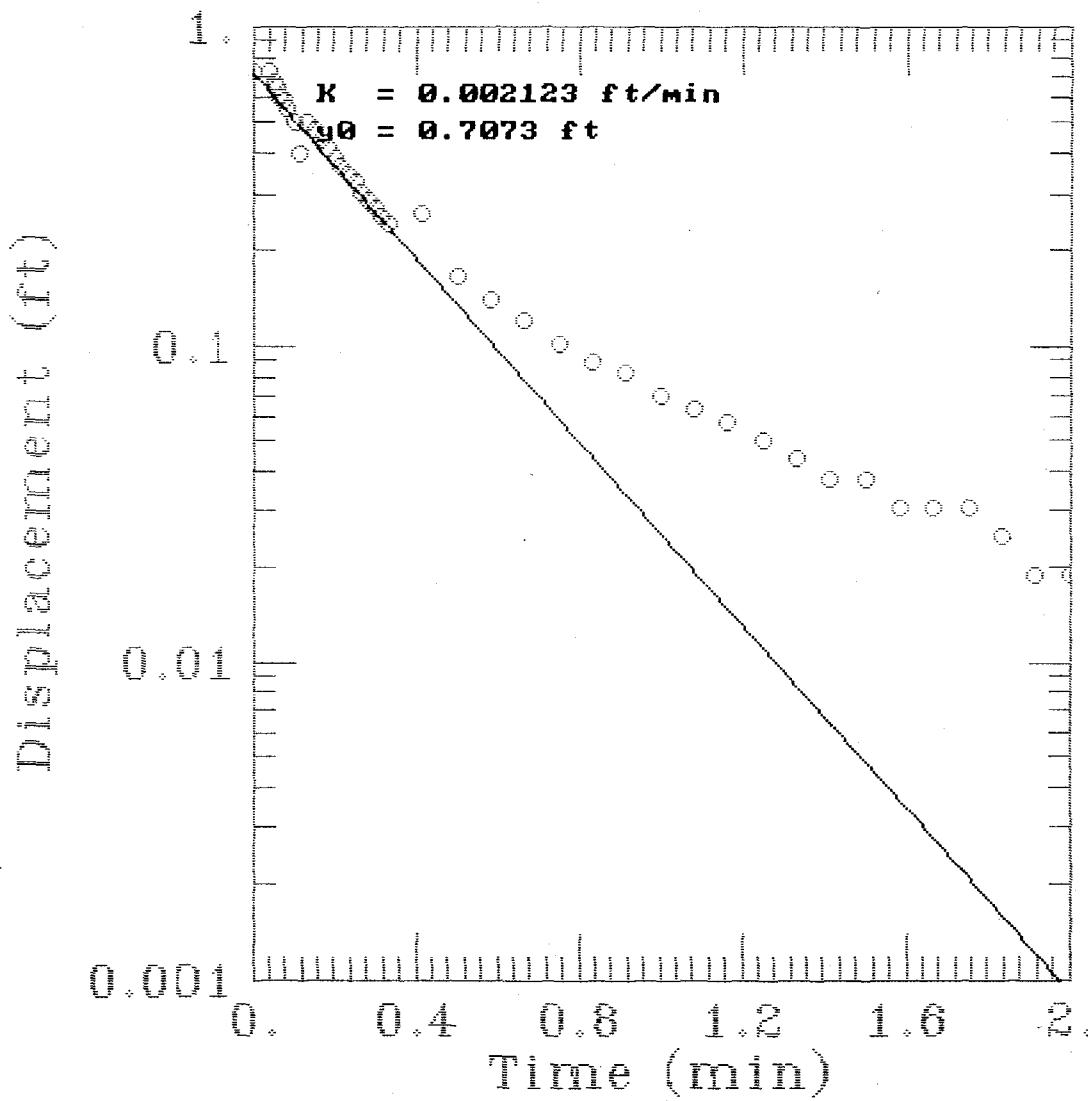


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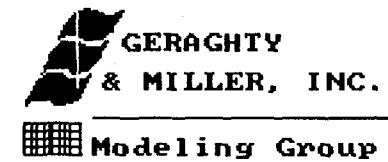


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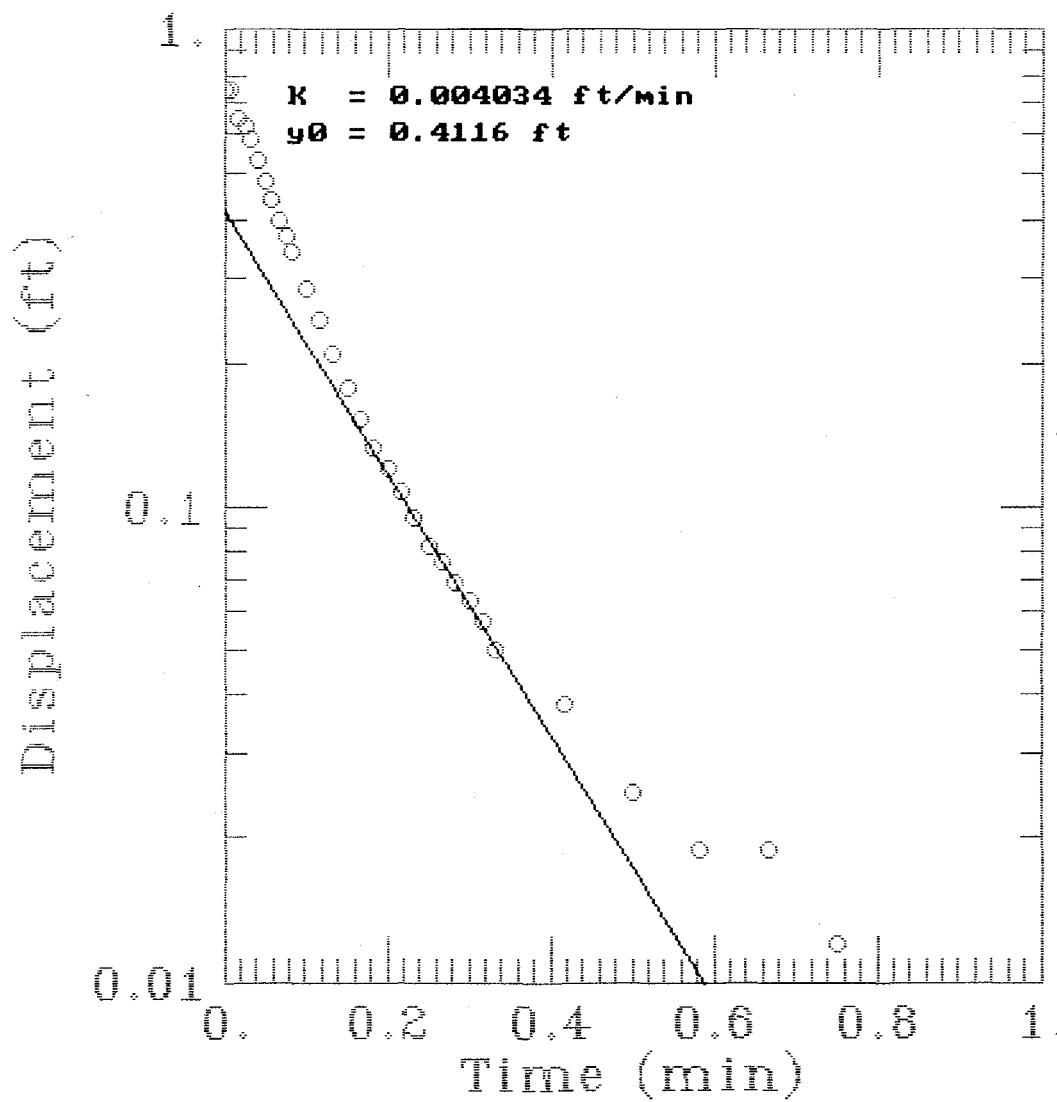
WHF-5-8S RUN #1



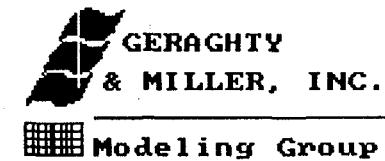
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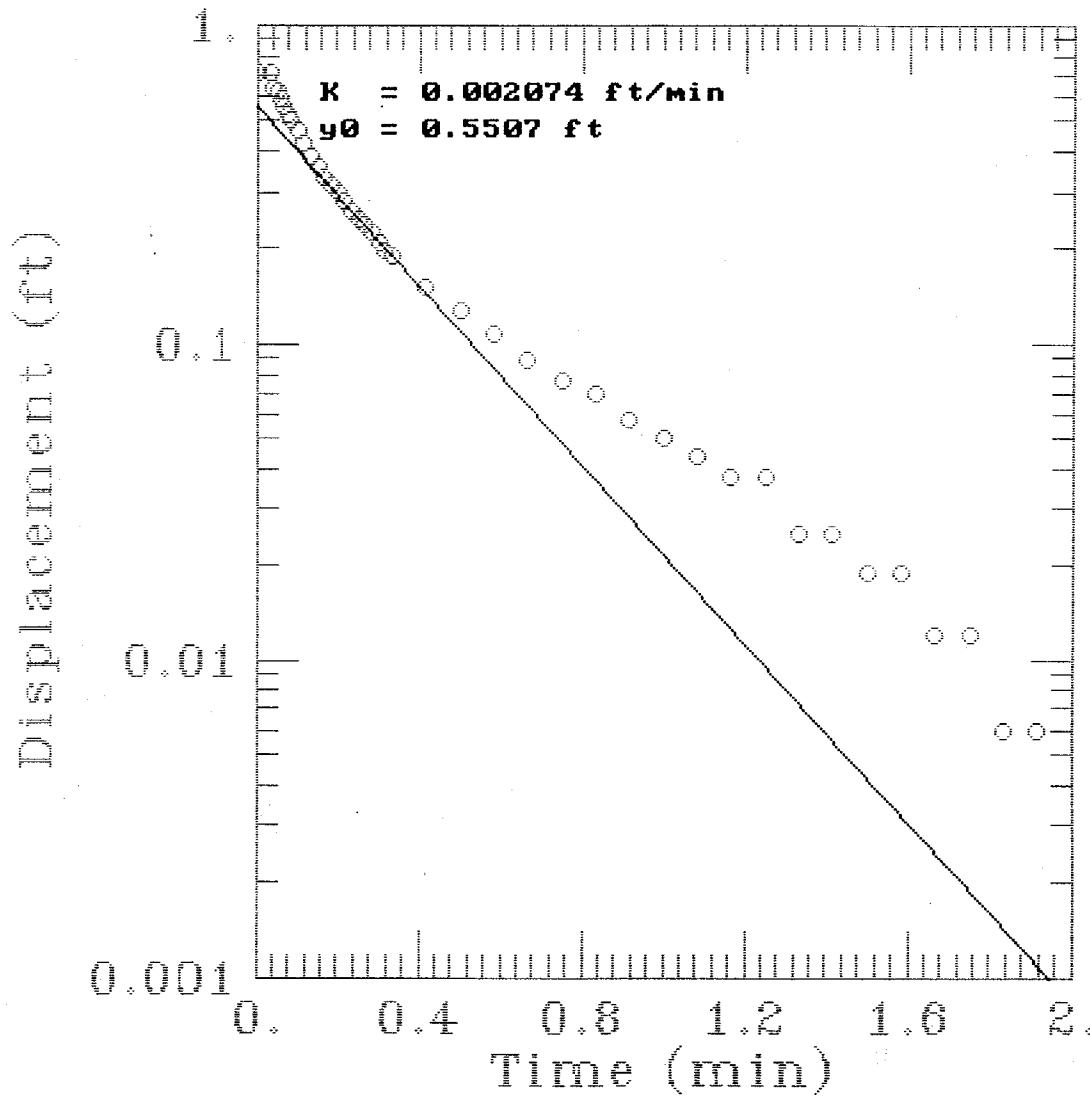
WHF-5-8S RUN #2



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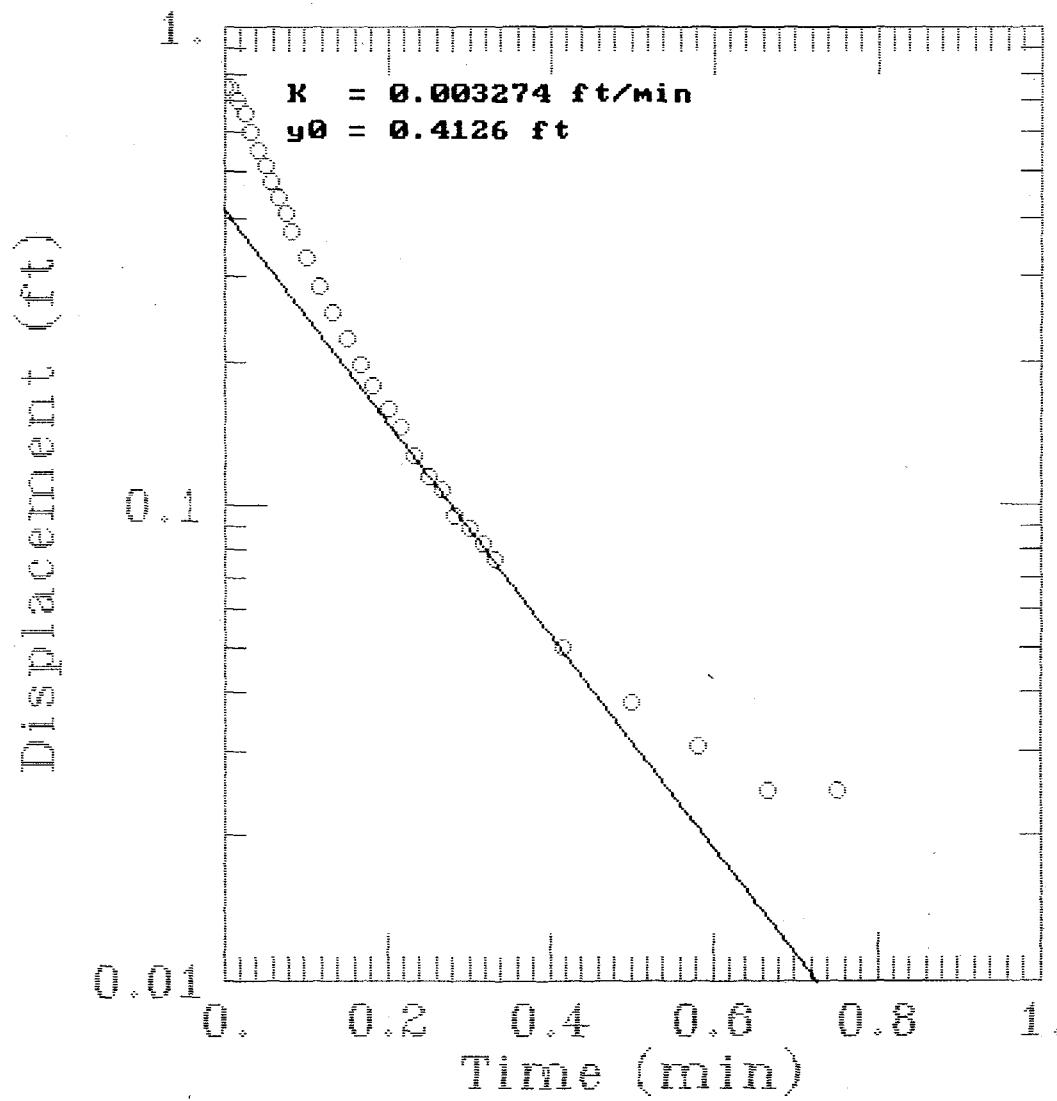


WHF-5-8S RUN #3

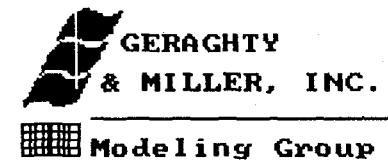


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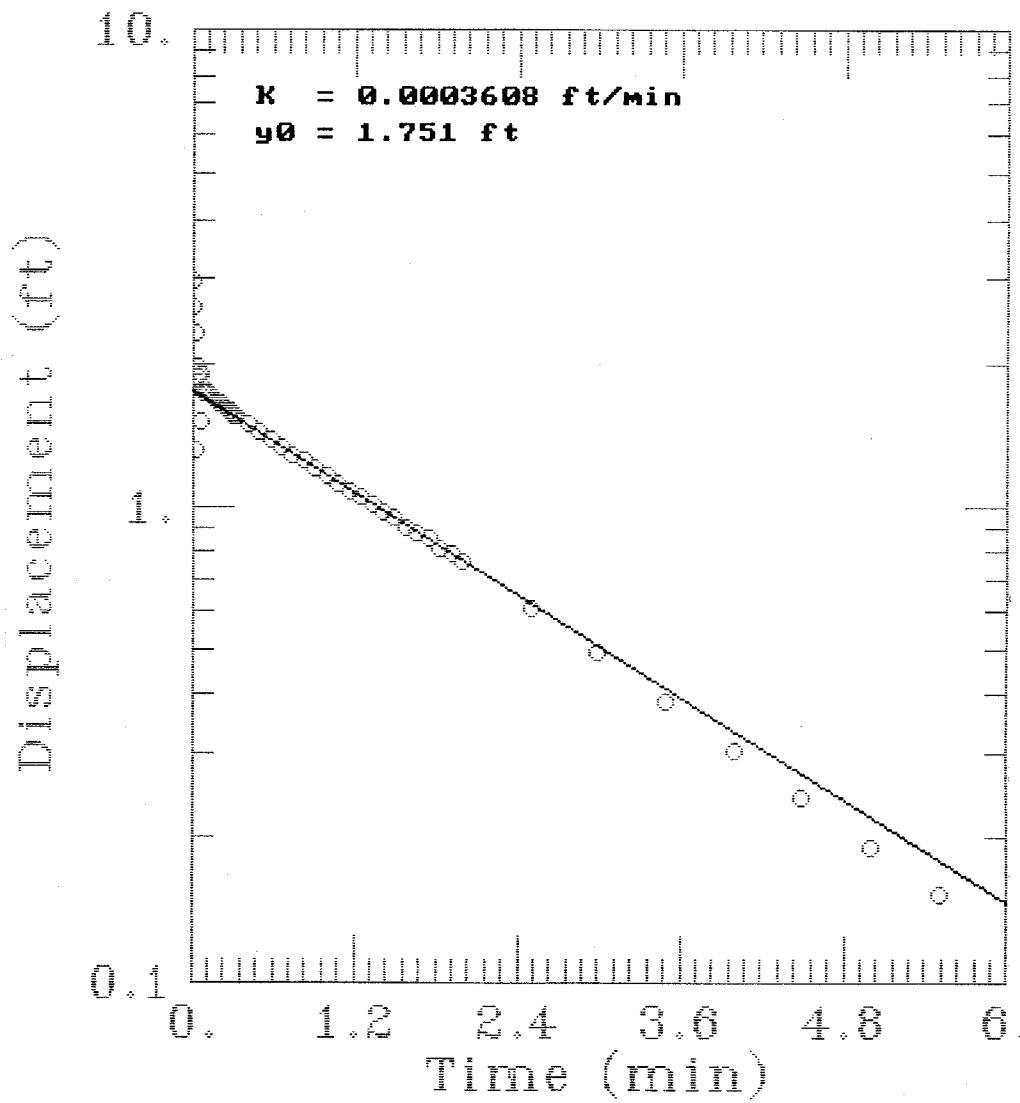
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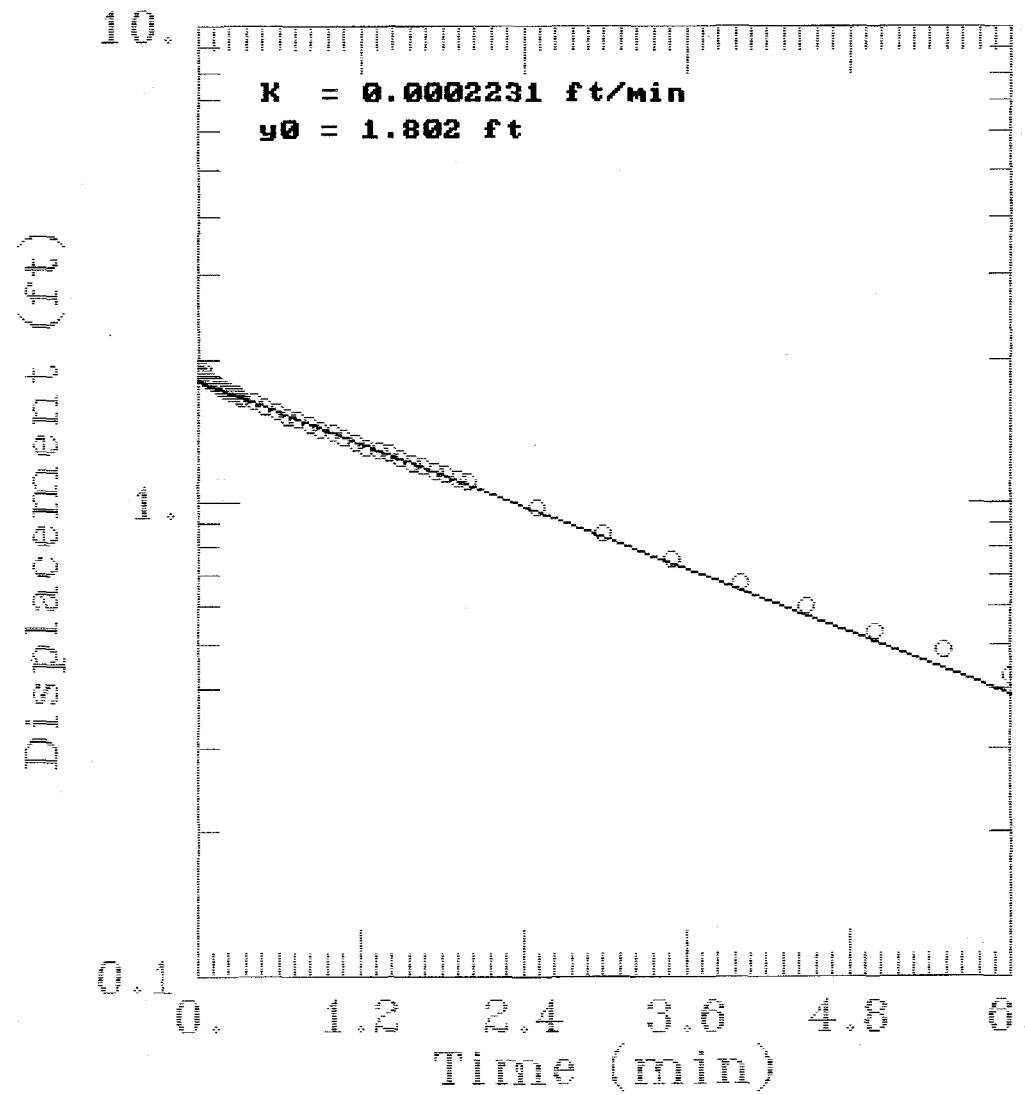


WHF-5-8D RUN #1

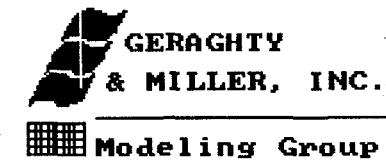


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WHF-5-8D RUN #2



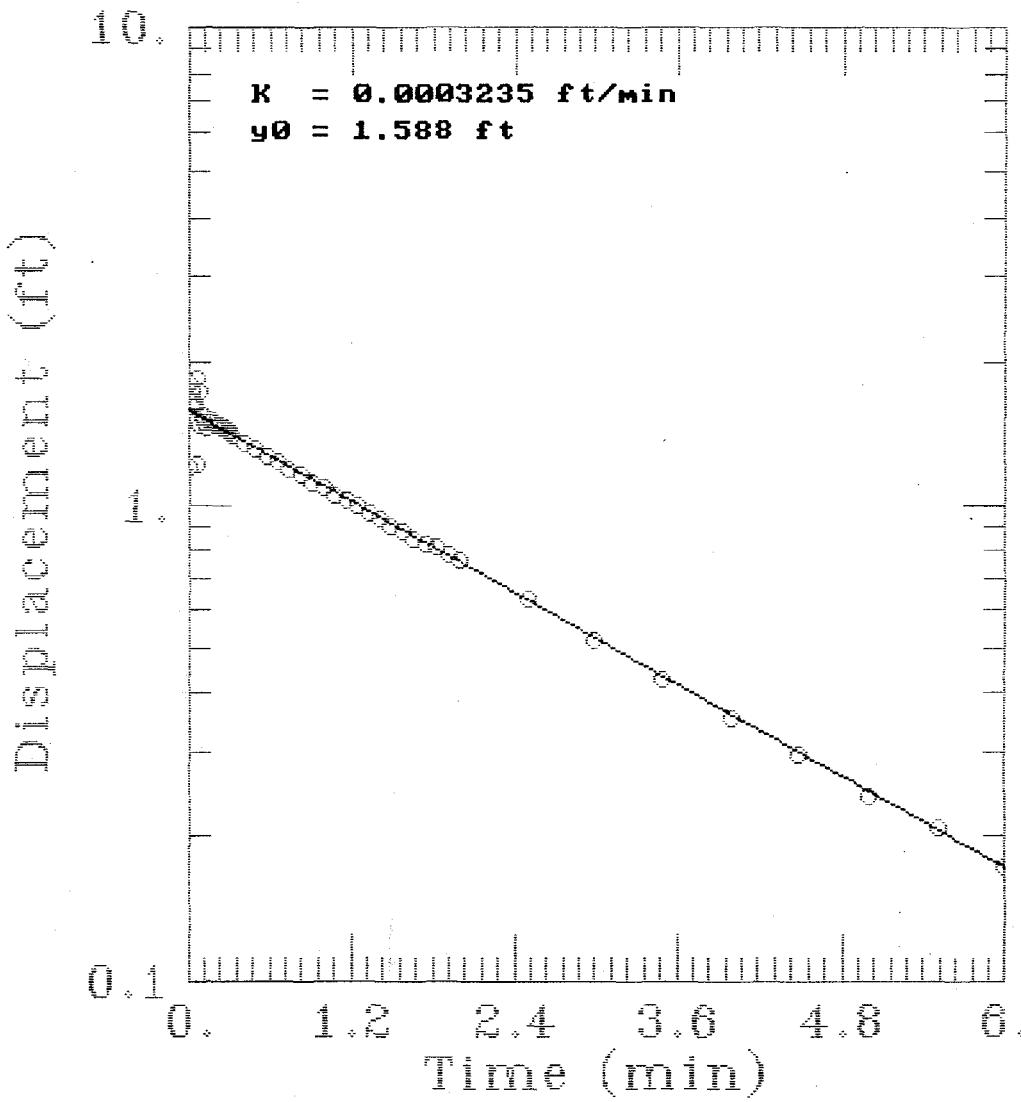
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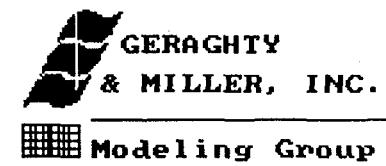
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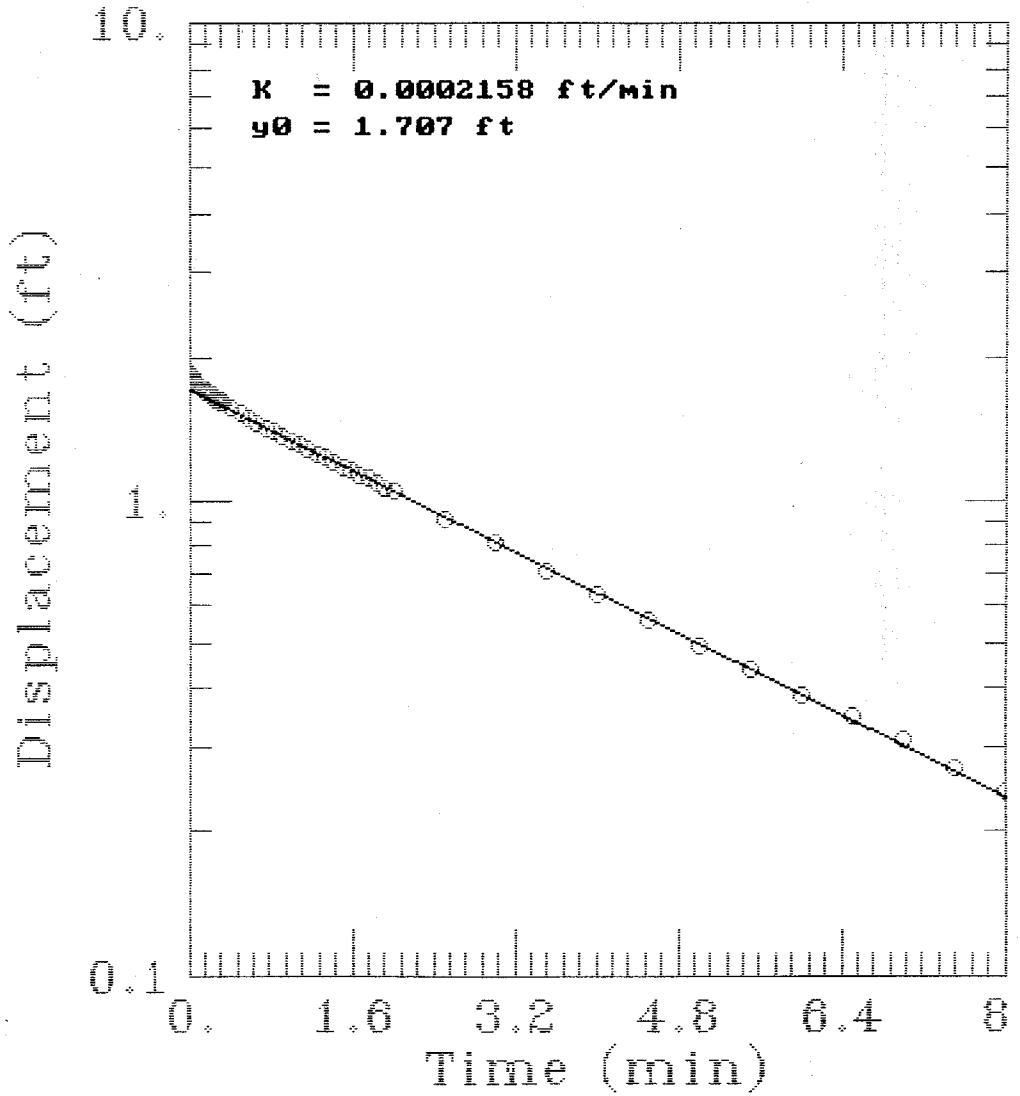
WHF-5-8D RUN #3



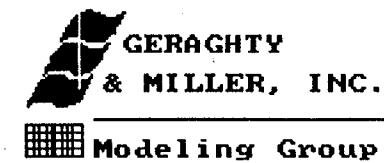
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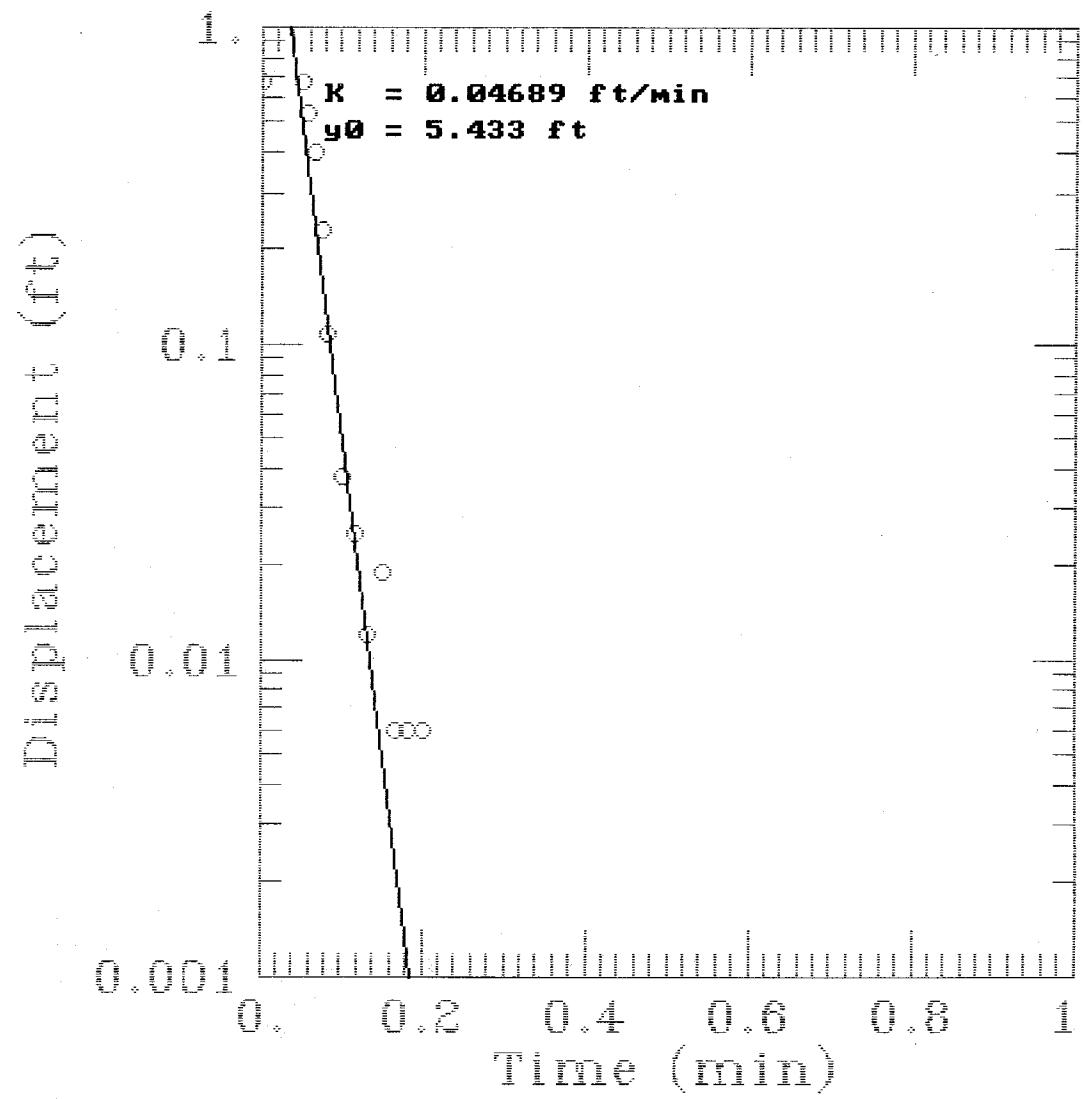
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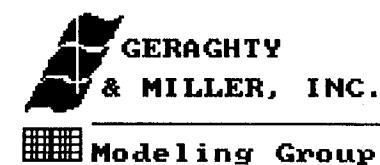
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WHF-5-10S RUN #1



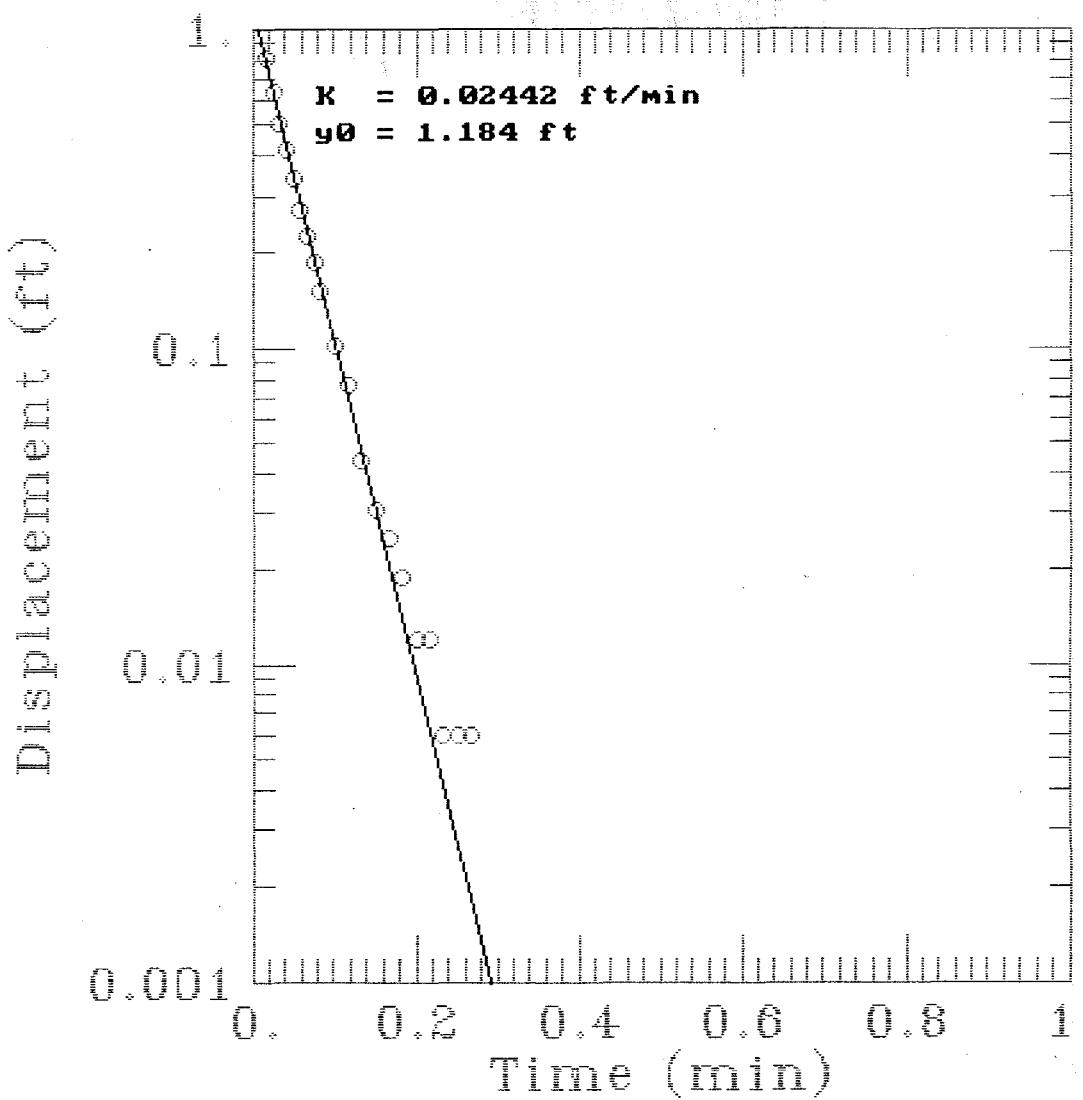
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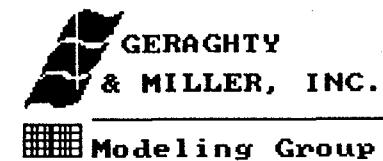
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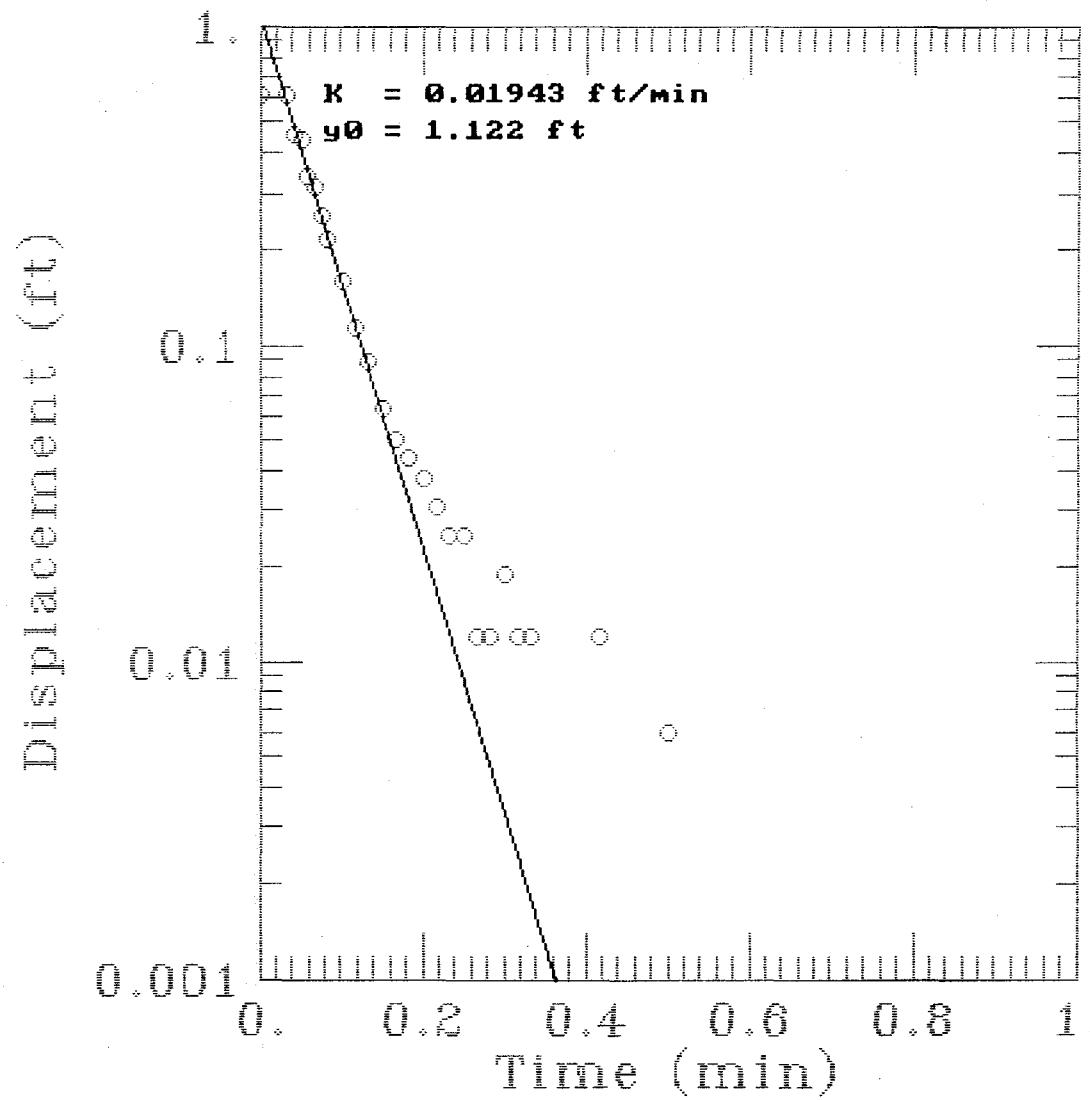
WHF-5-10S RUN #2



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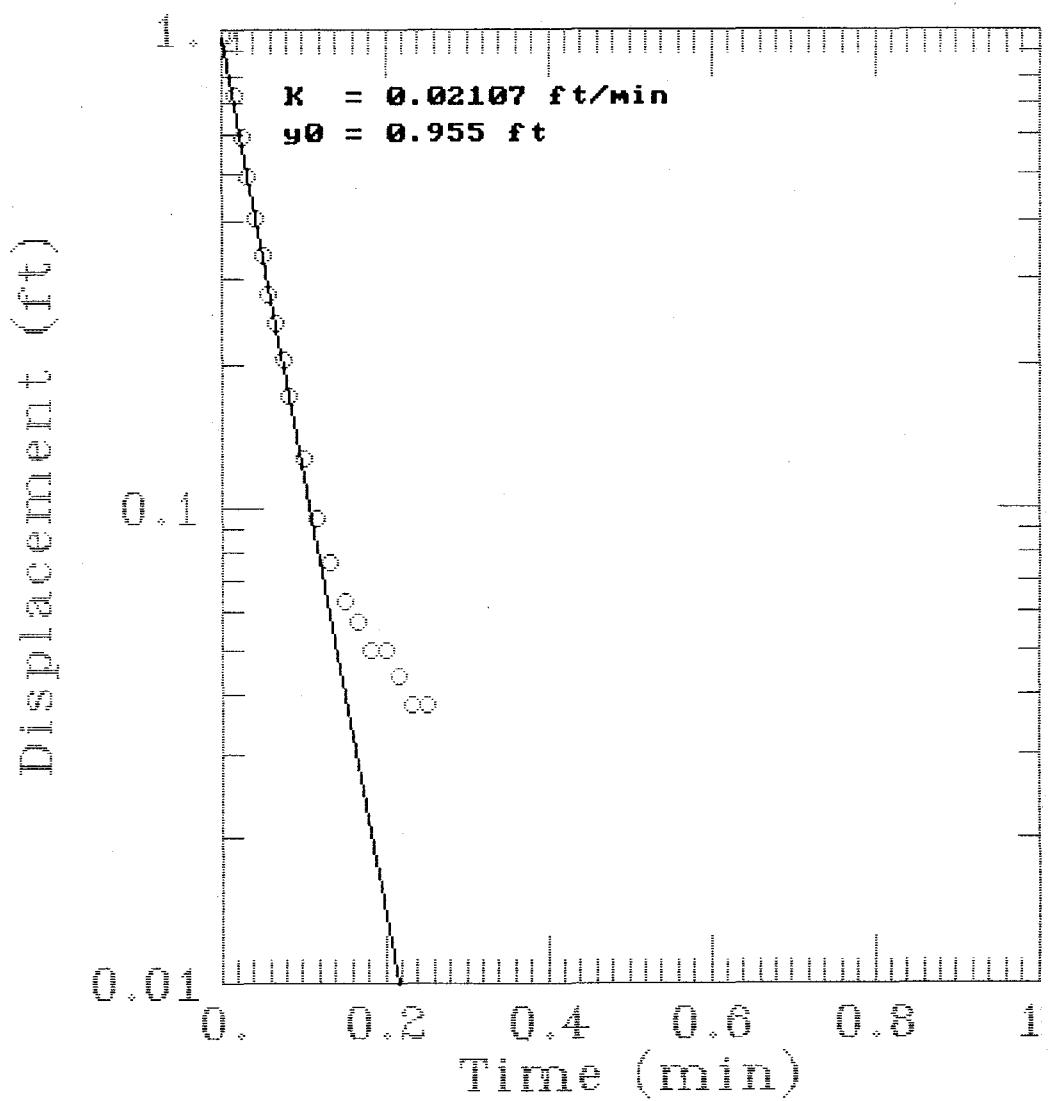


WHF-5-10S RUN #3

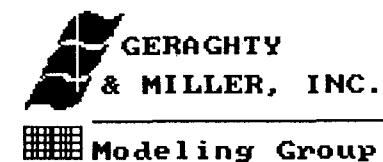


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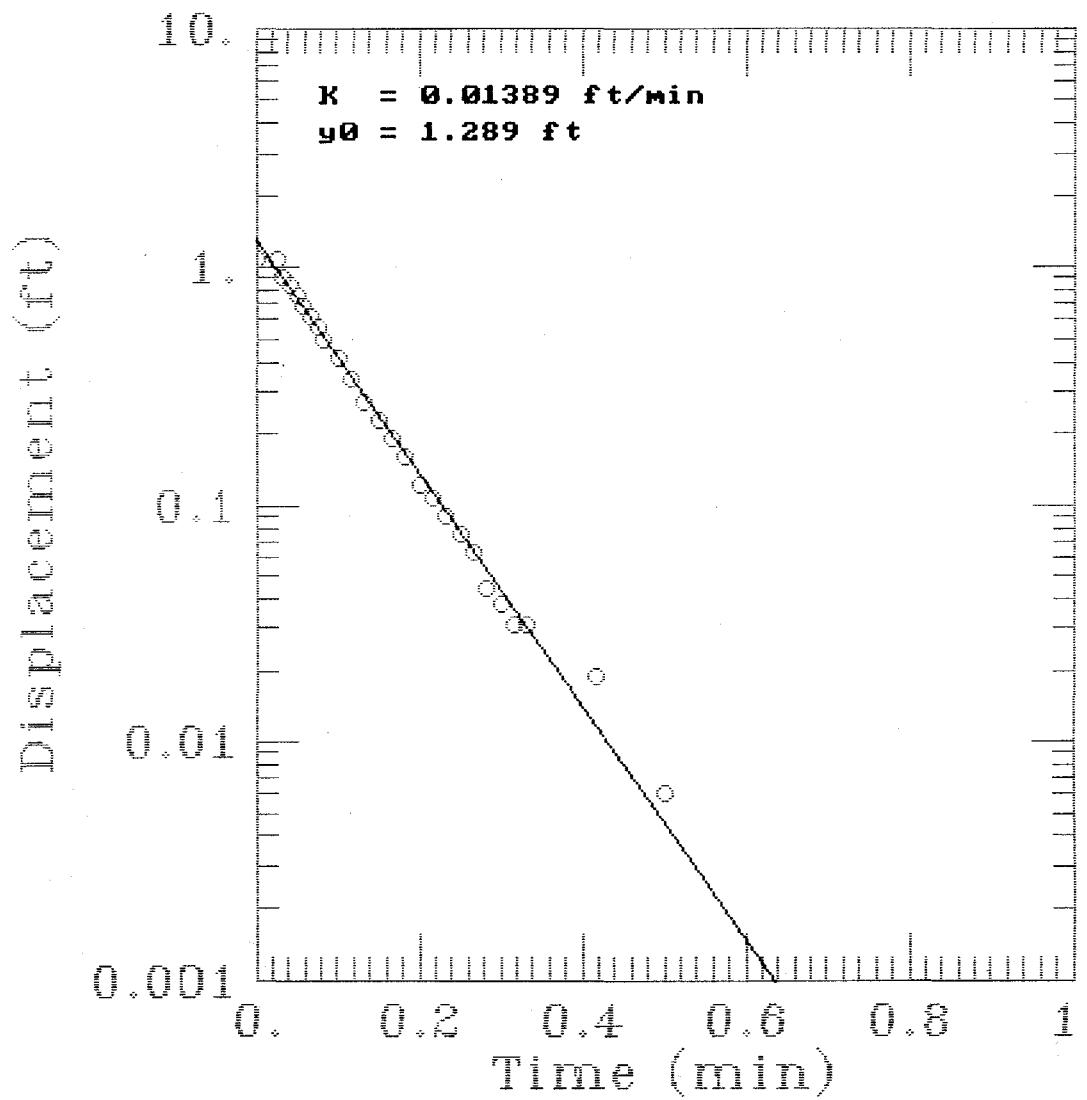
WHF-5-10S RUN #4



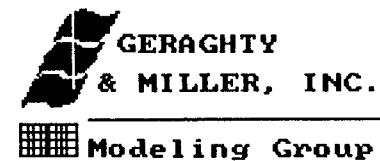
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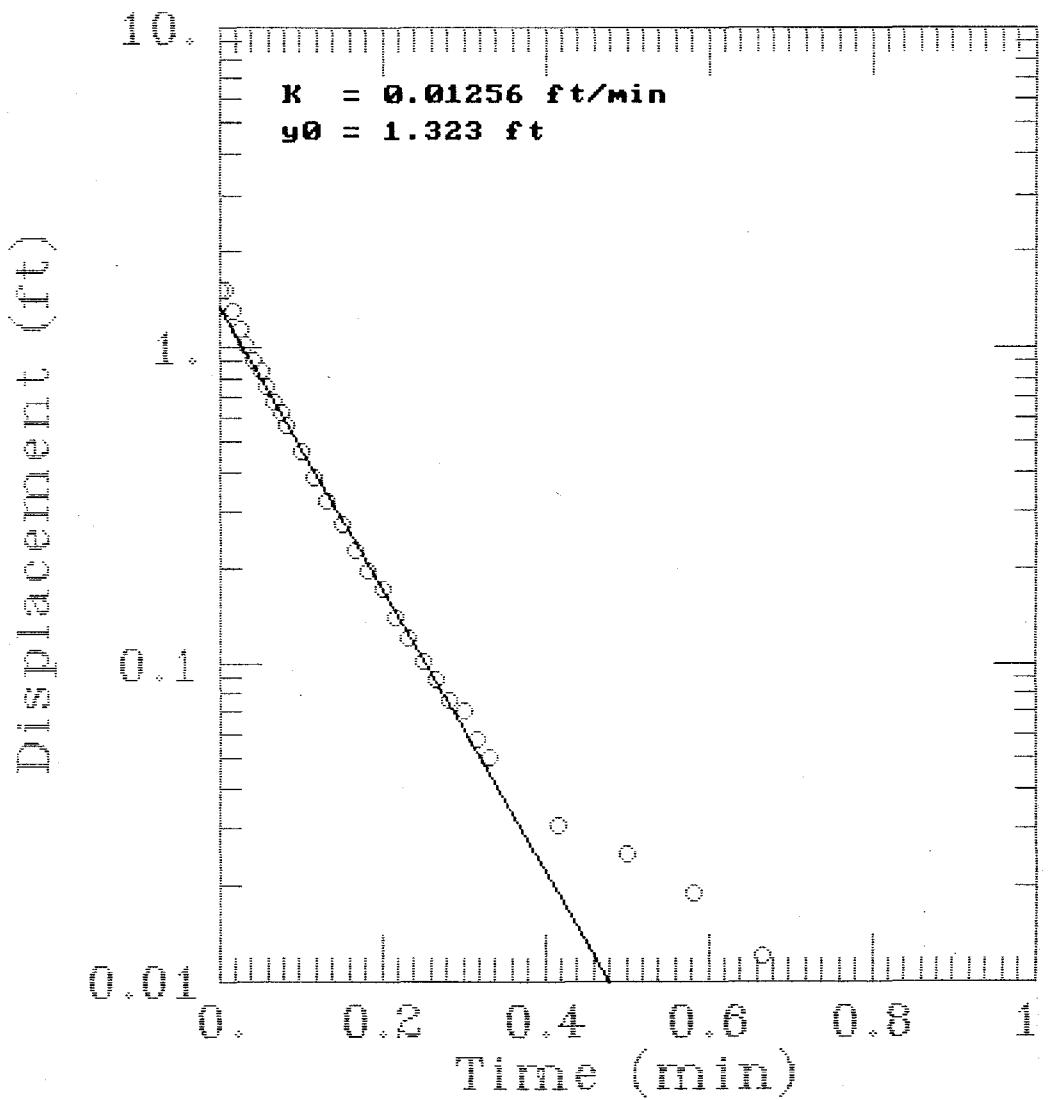
WHF-5-10D RUN #1



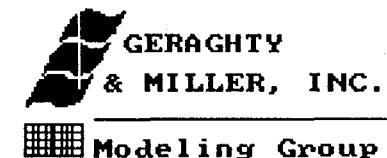
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WHF-5-10D RUN #2

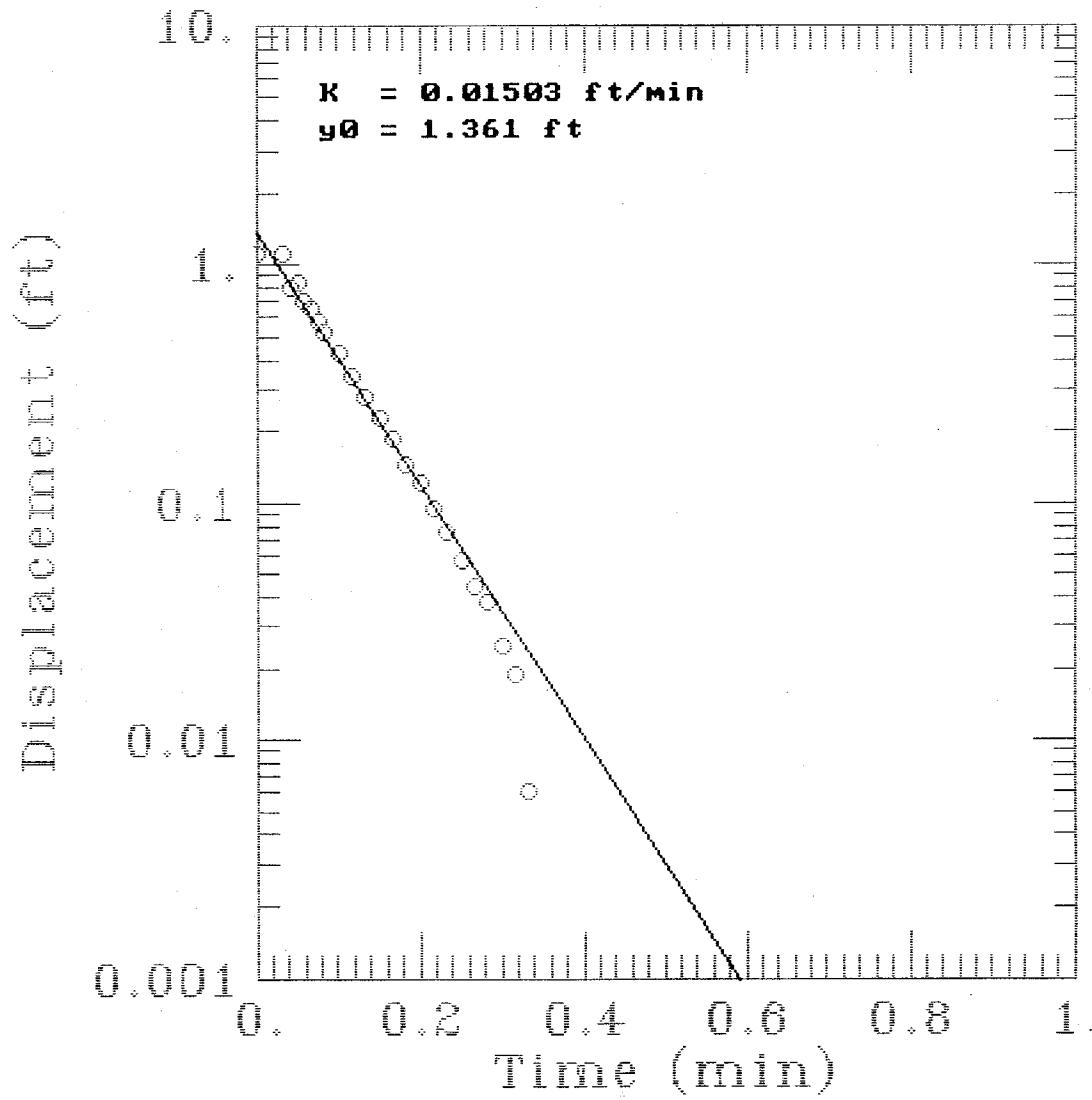


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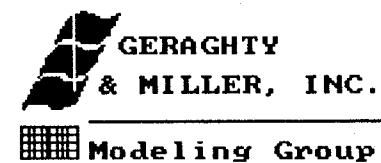


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WHF-5-10D RUN #3

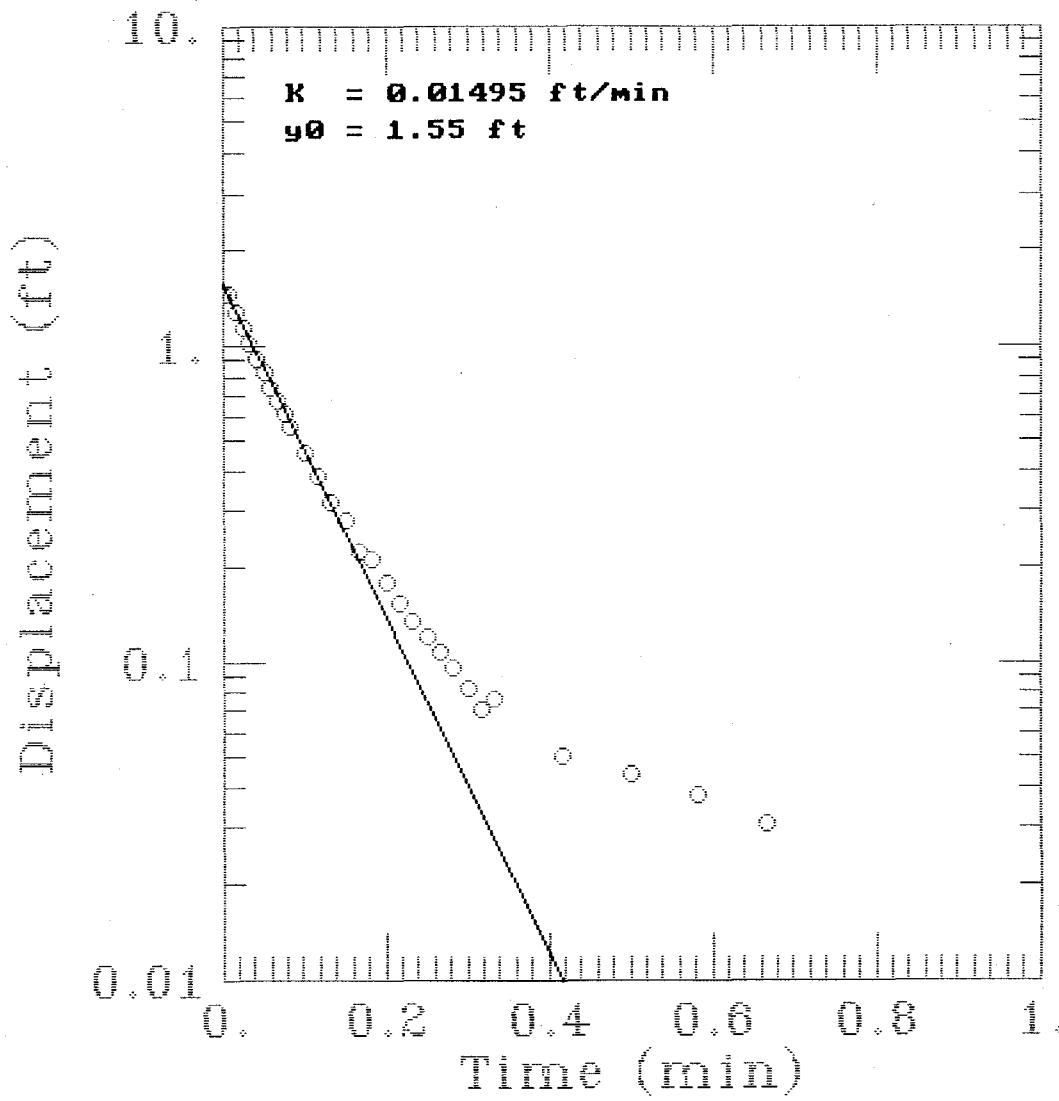


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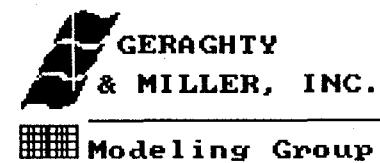


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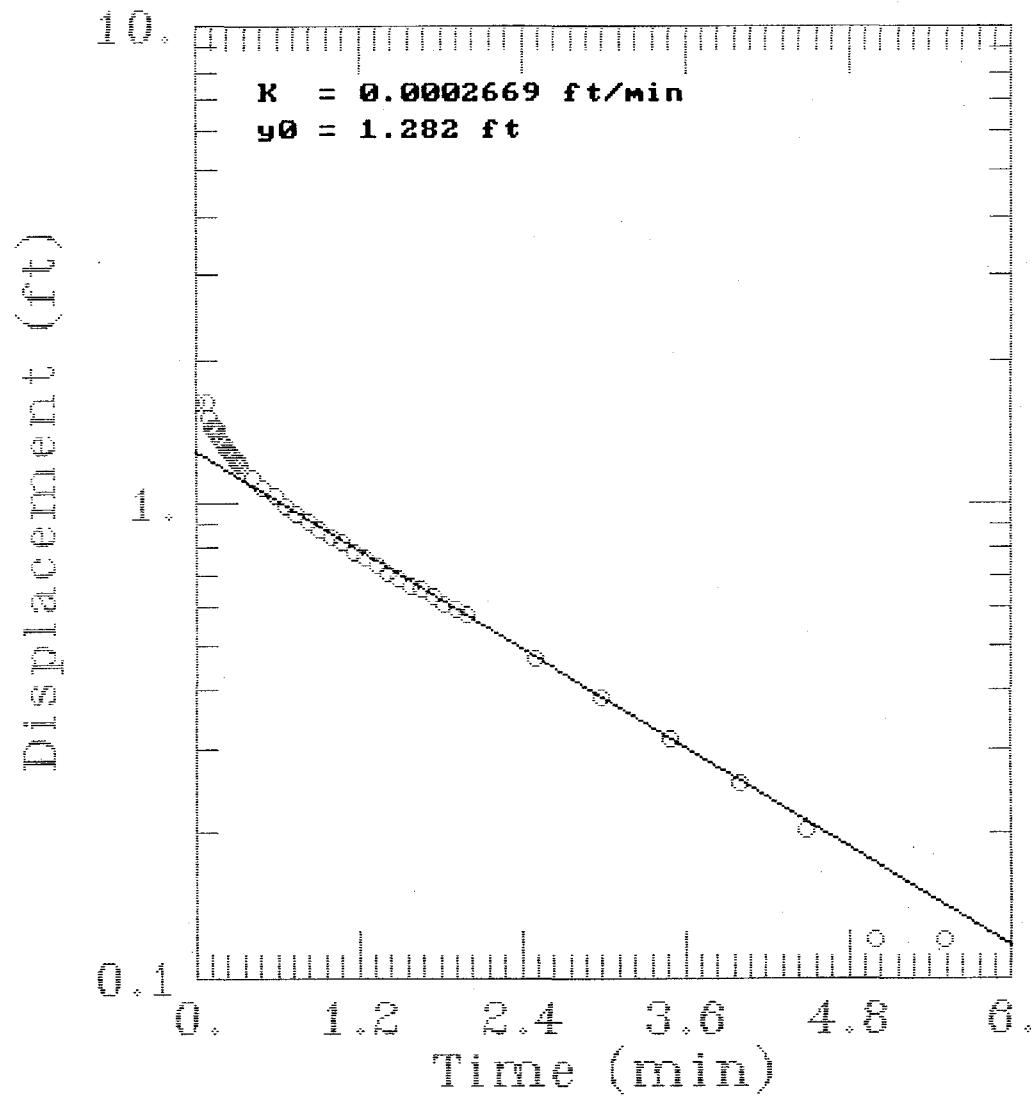
WHF-5-10D RUN #4



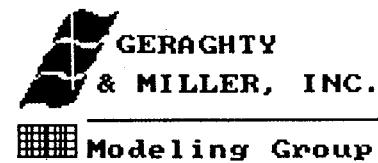
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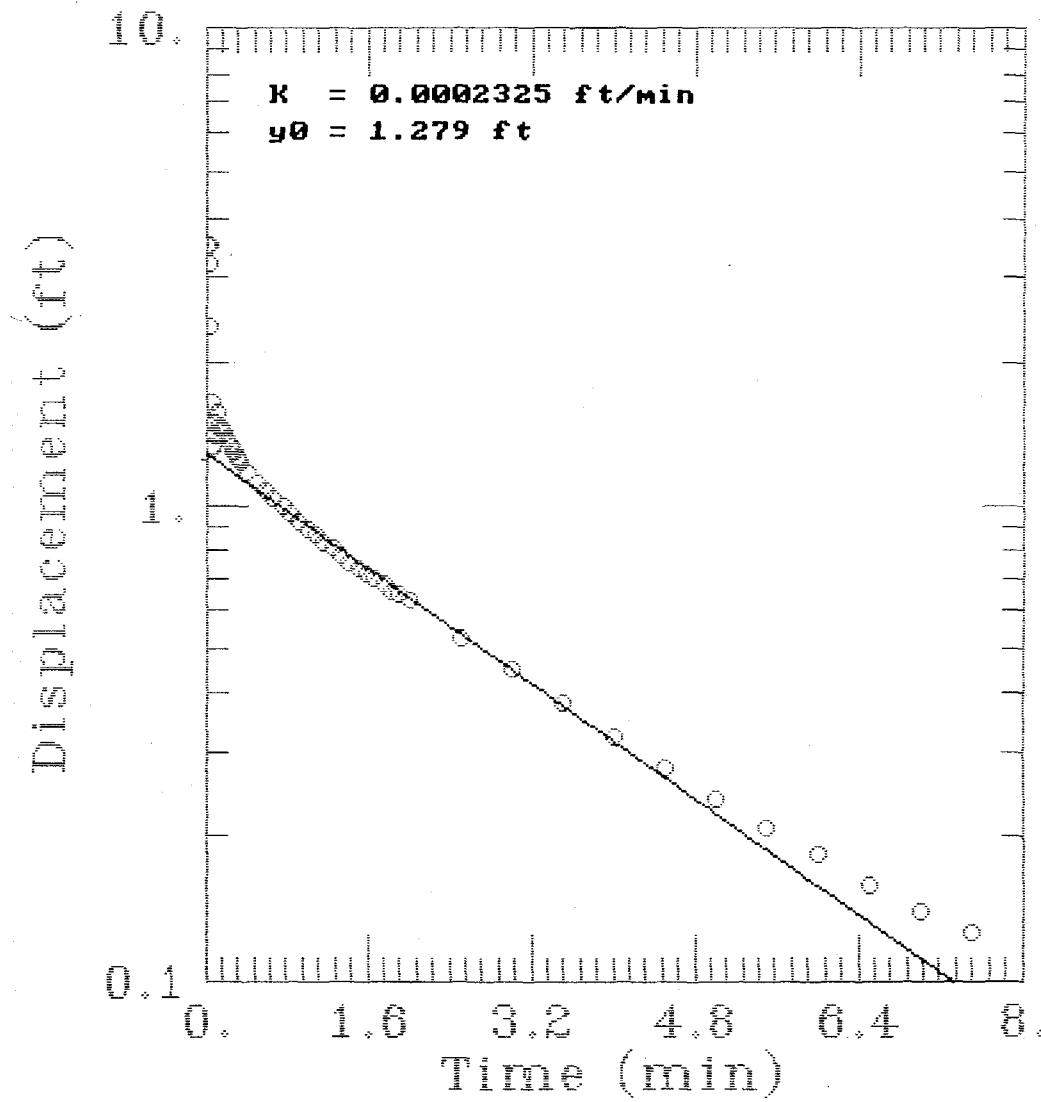
WHF-6-1S RUN #1



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WHF-6-1S RUN #2

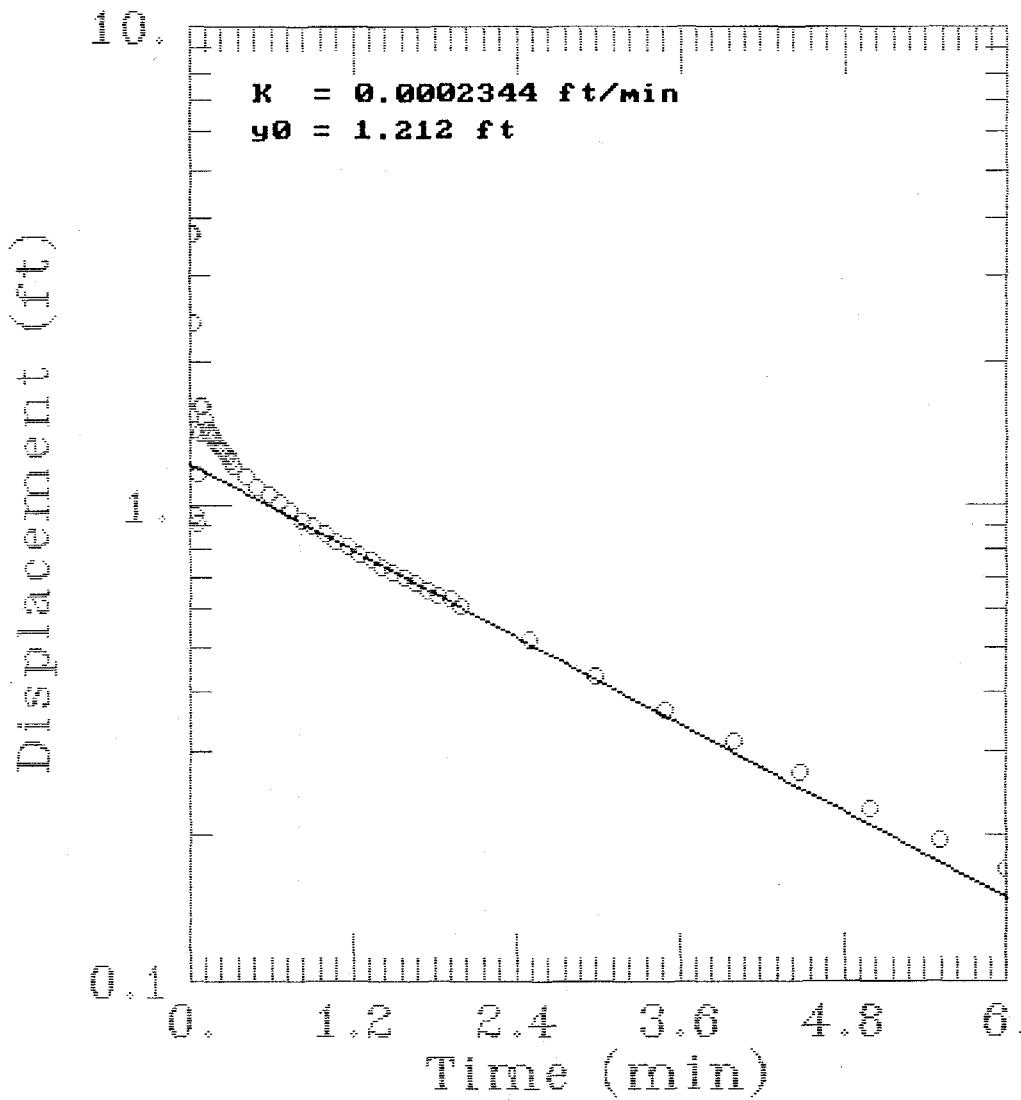


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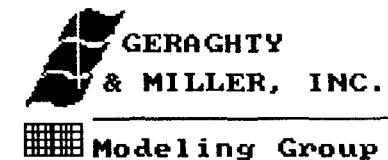
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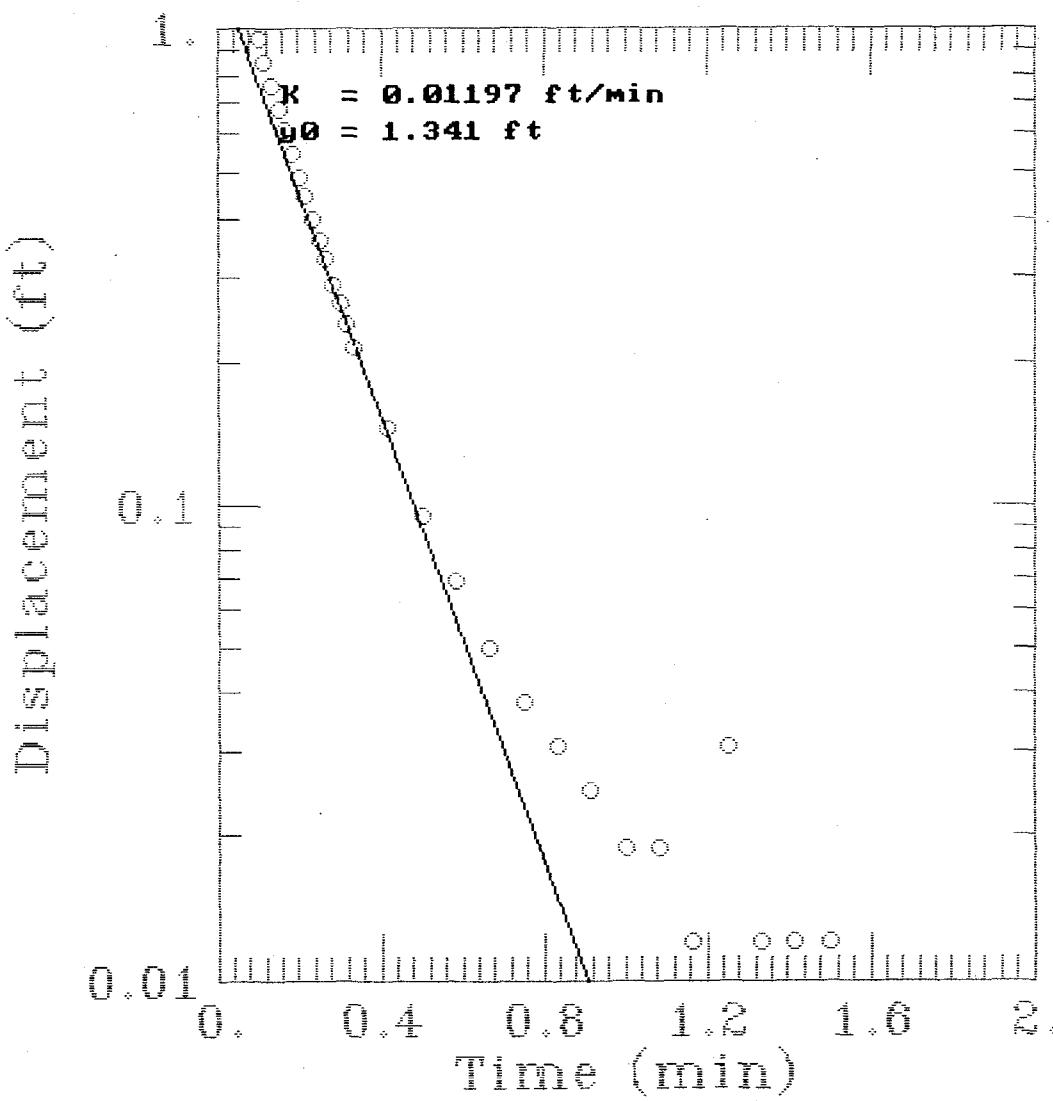
WHF-6-1S RUN #3



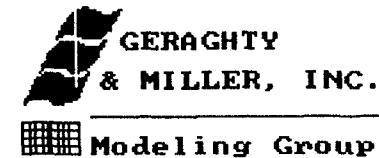
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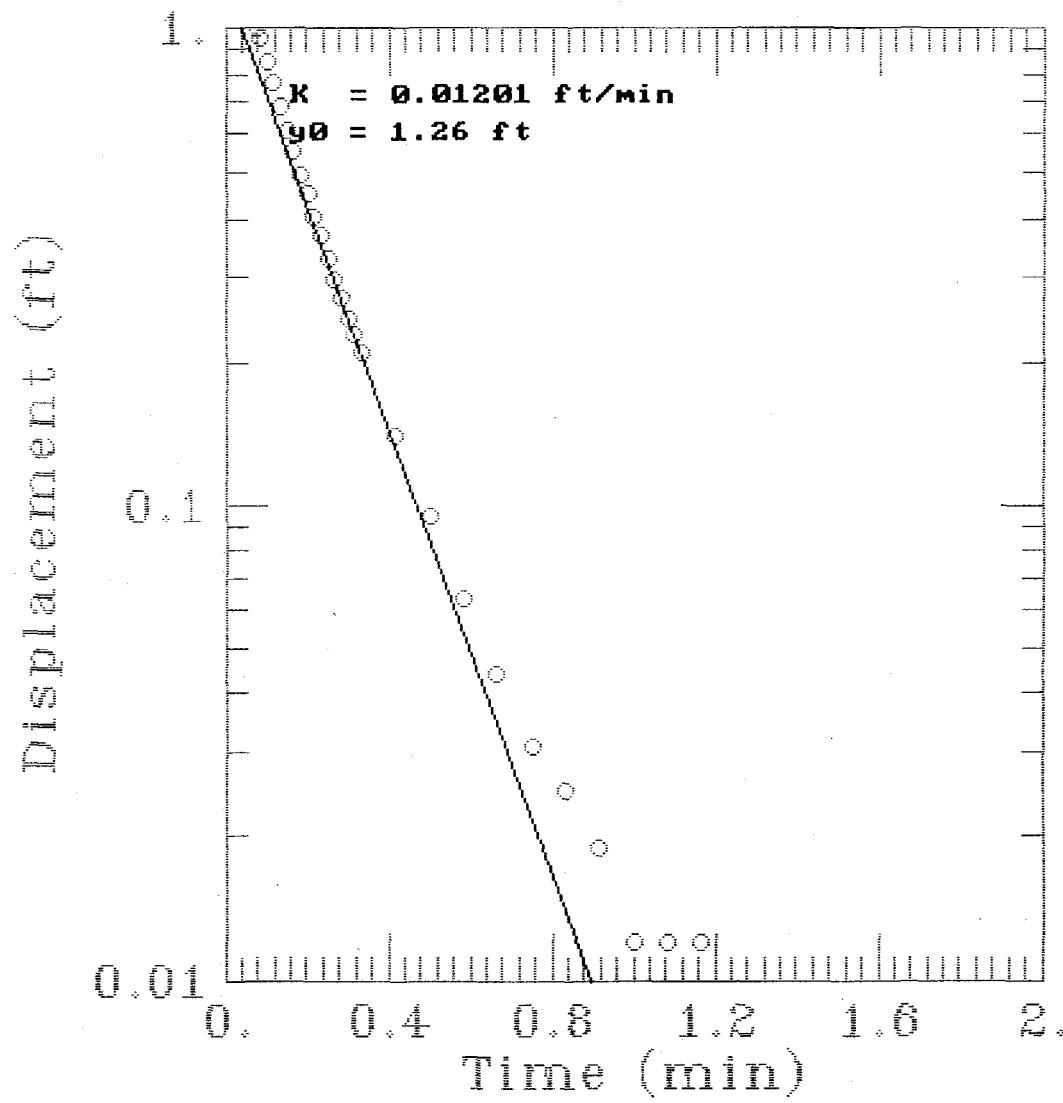
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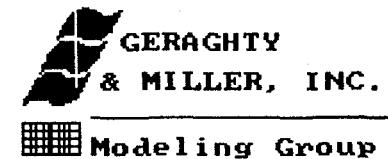
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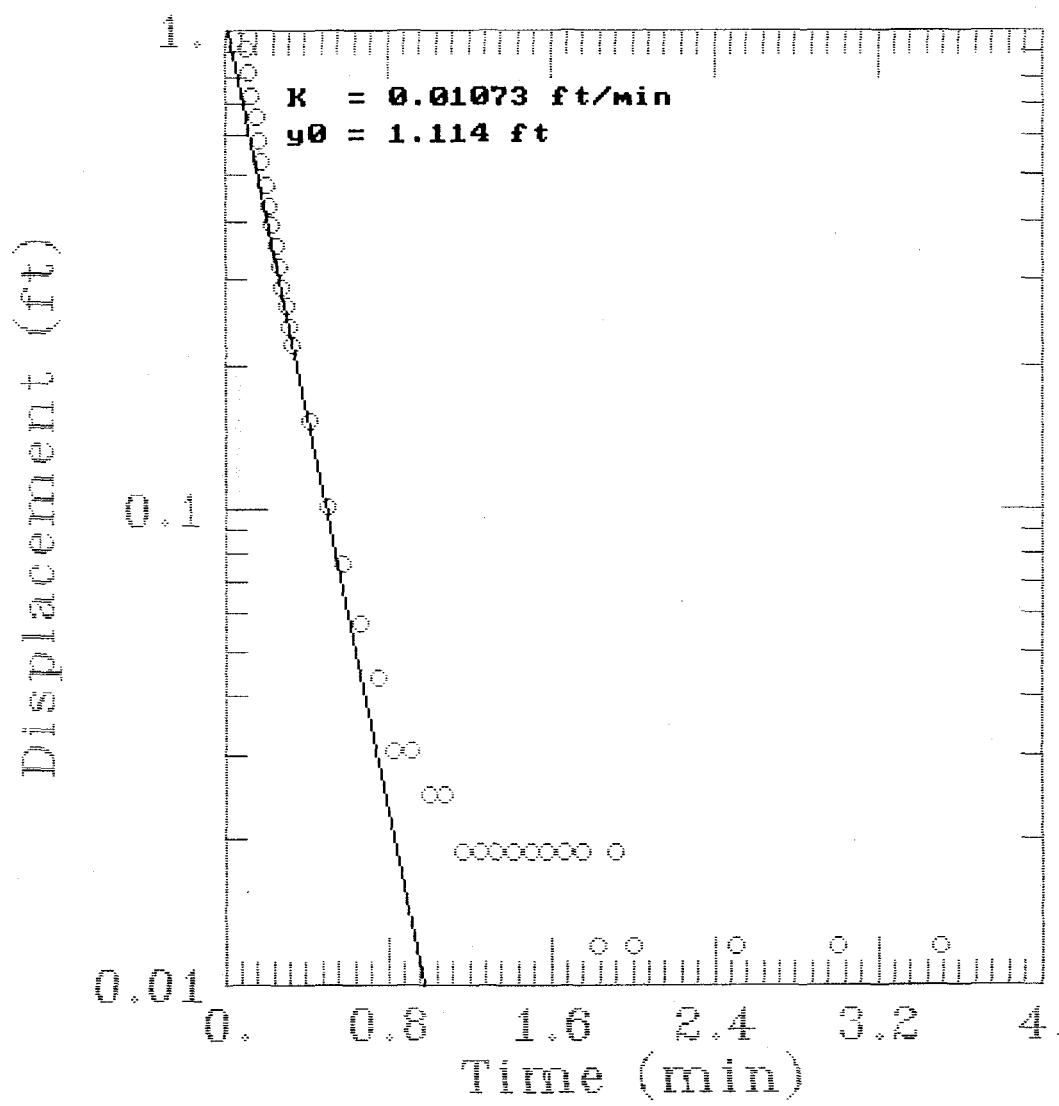
WHF-6-1D RUN #2



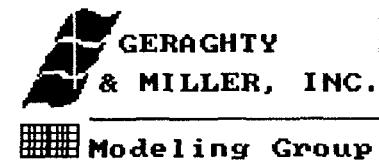
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WHF-6-1D RUN #3

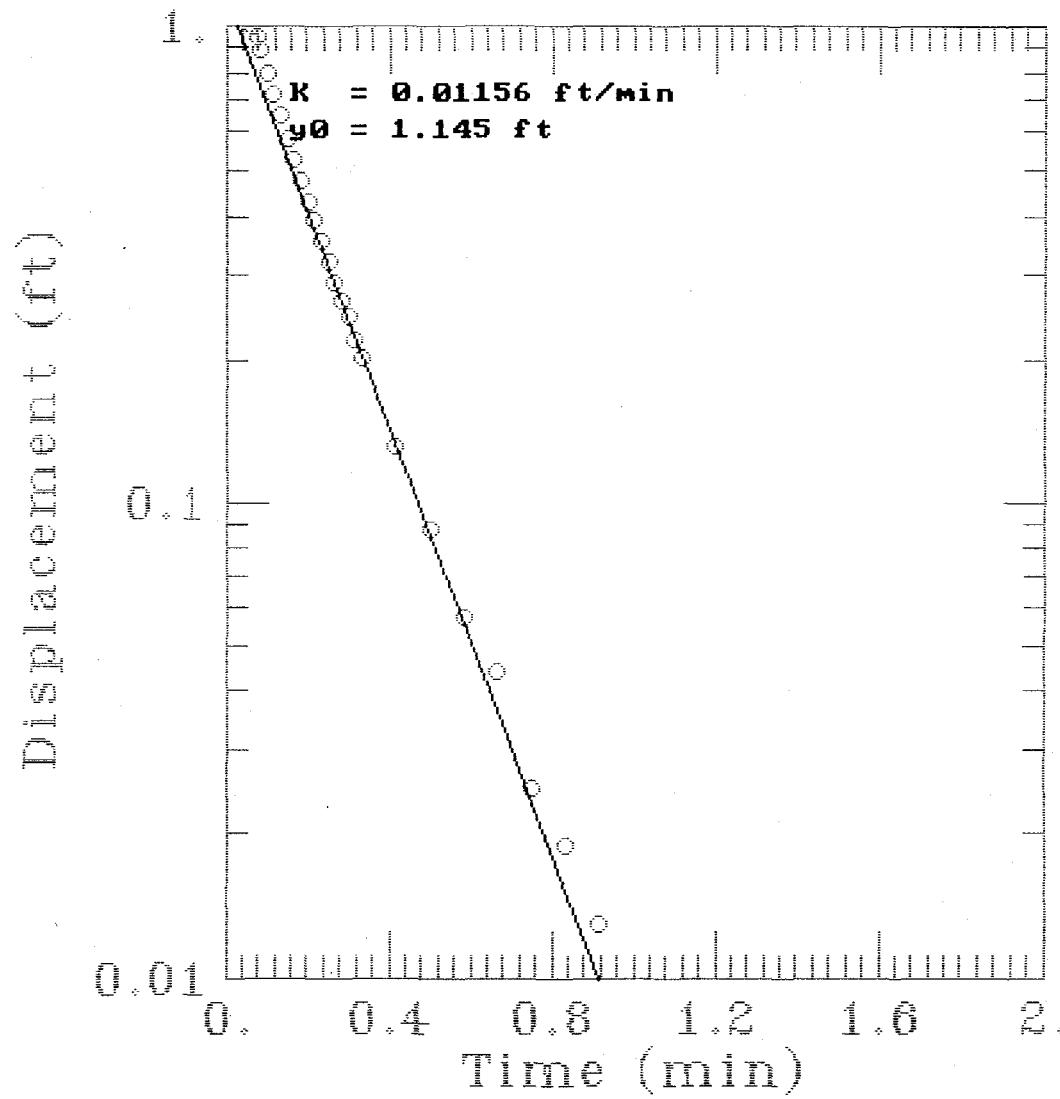


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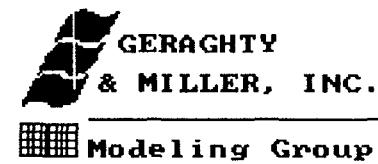


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WHF-6-1D RUN #4



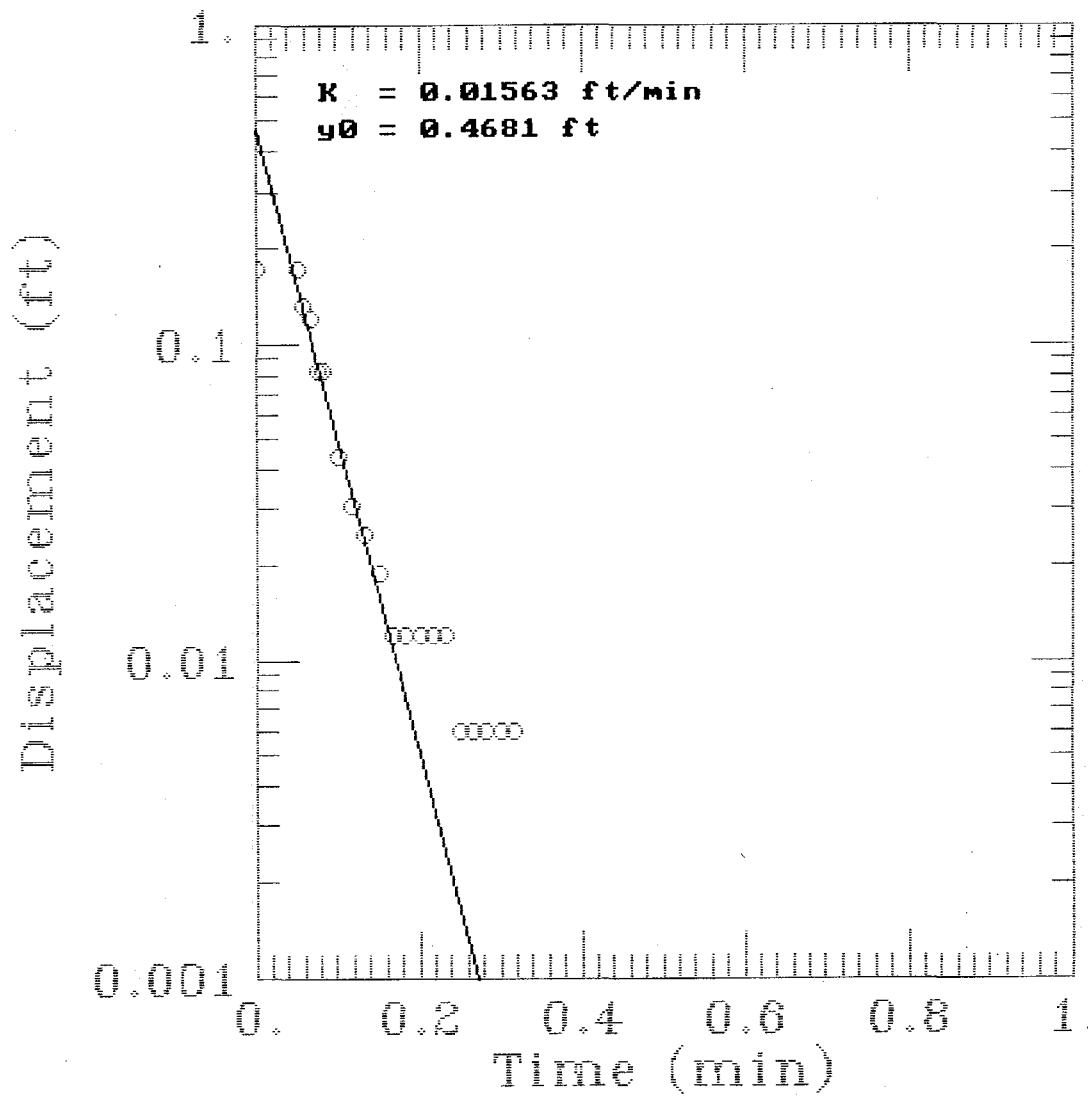
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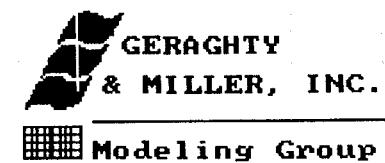
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WHF-10-2 RUN #1



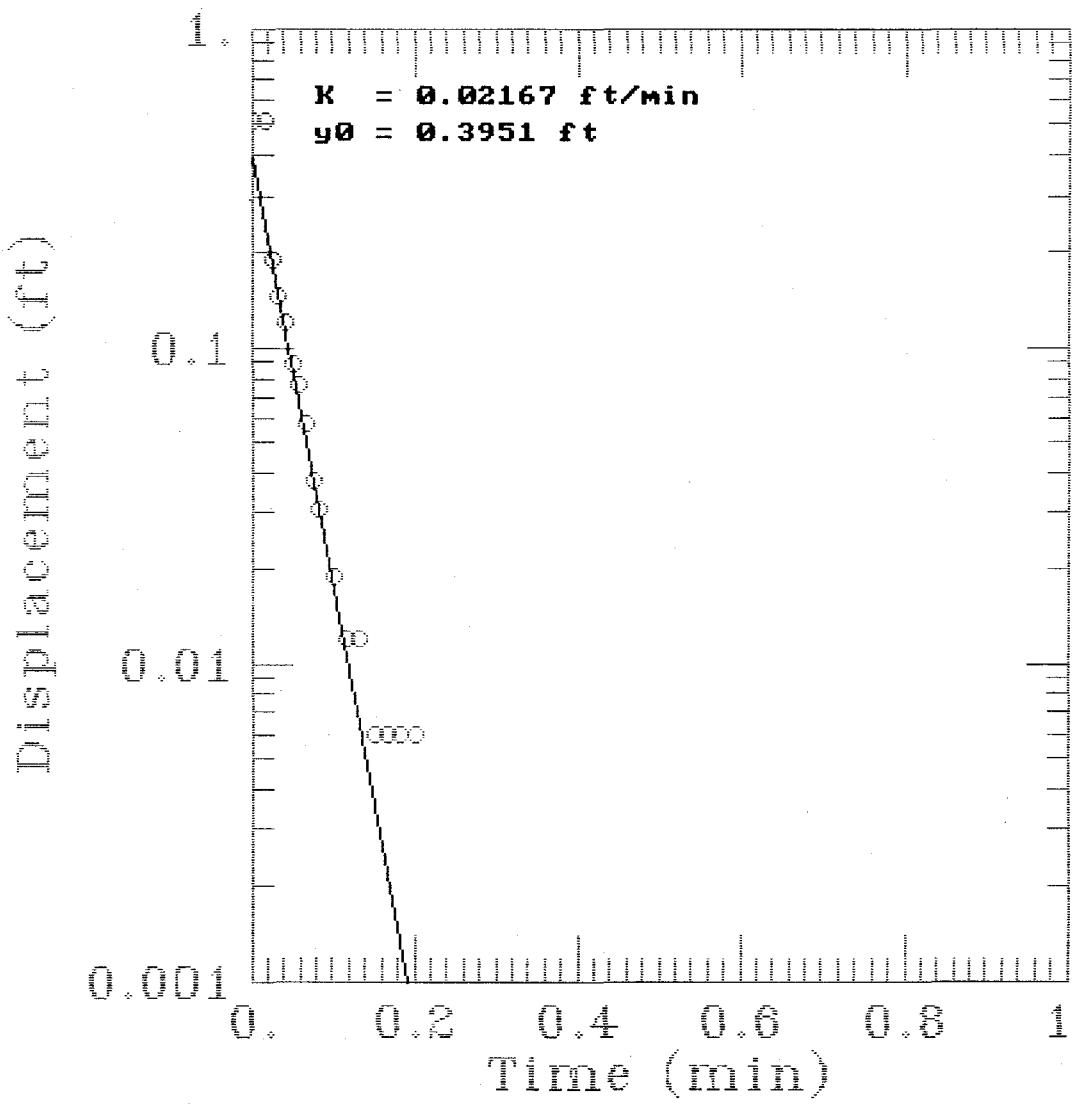
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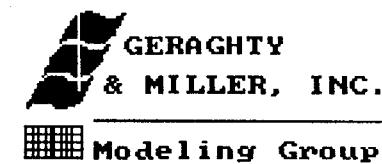
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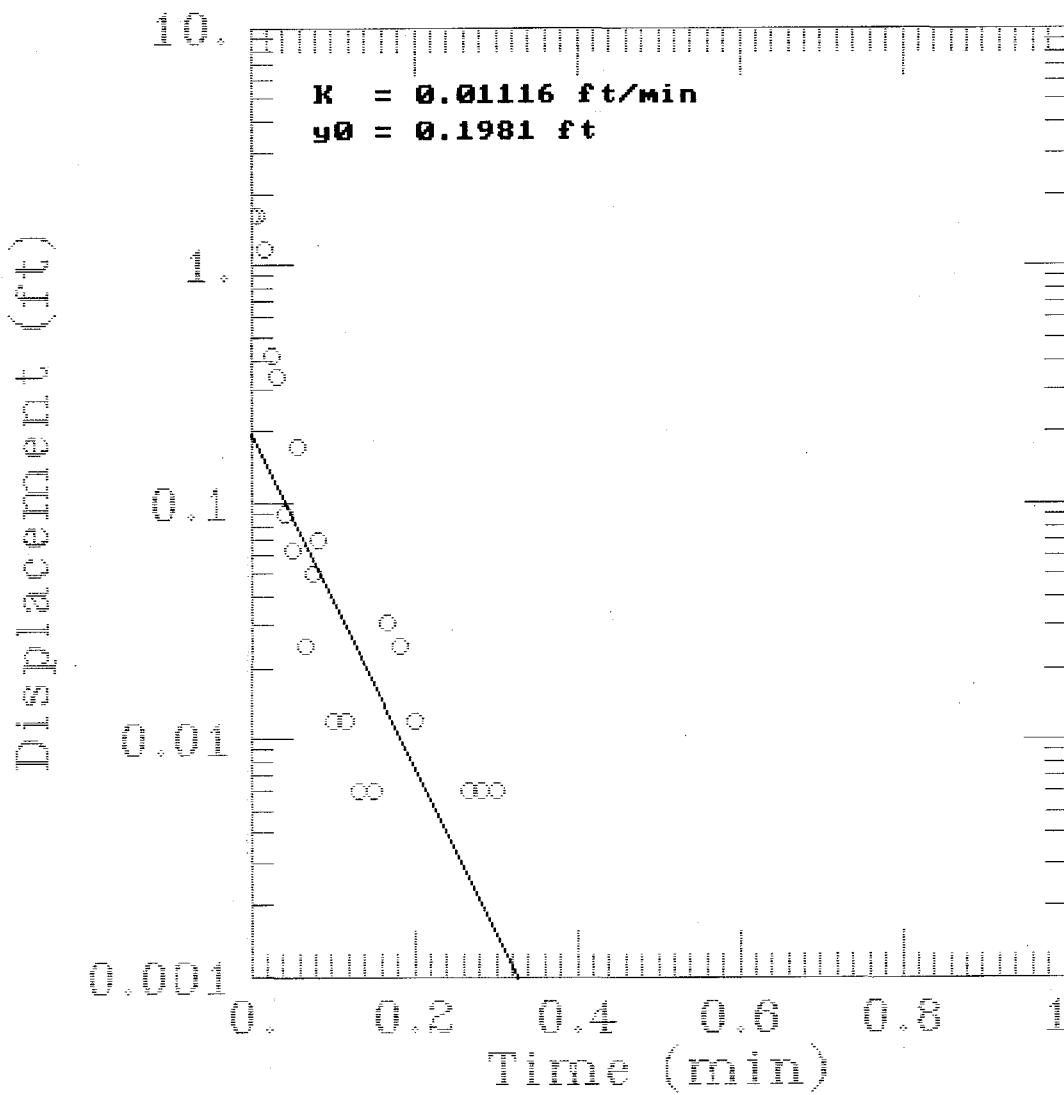
WHF-10-2 RUN #2



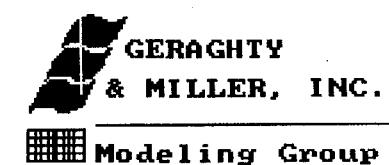
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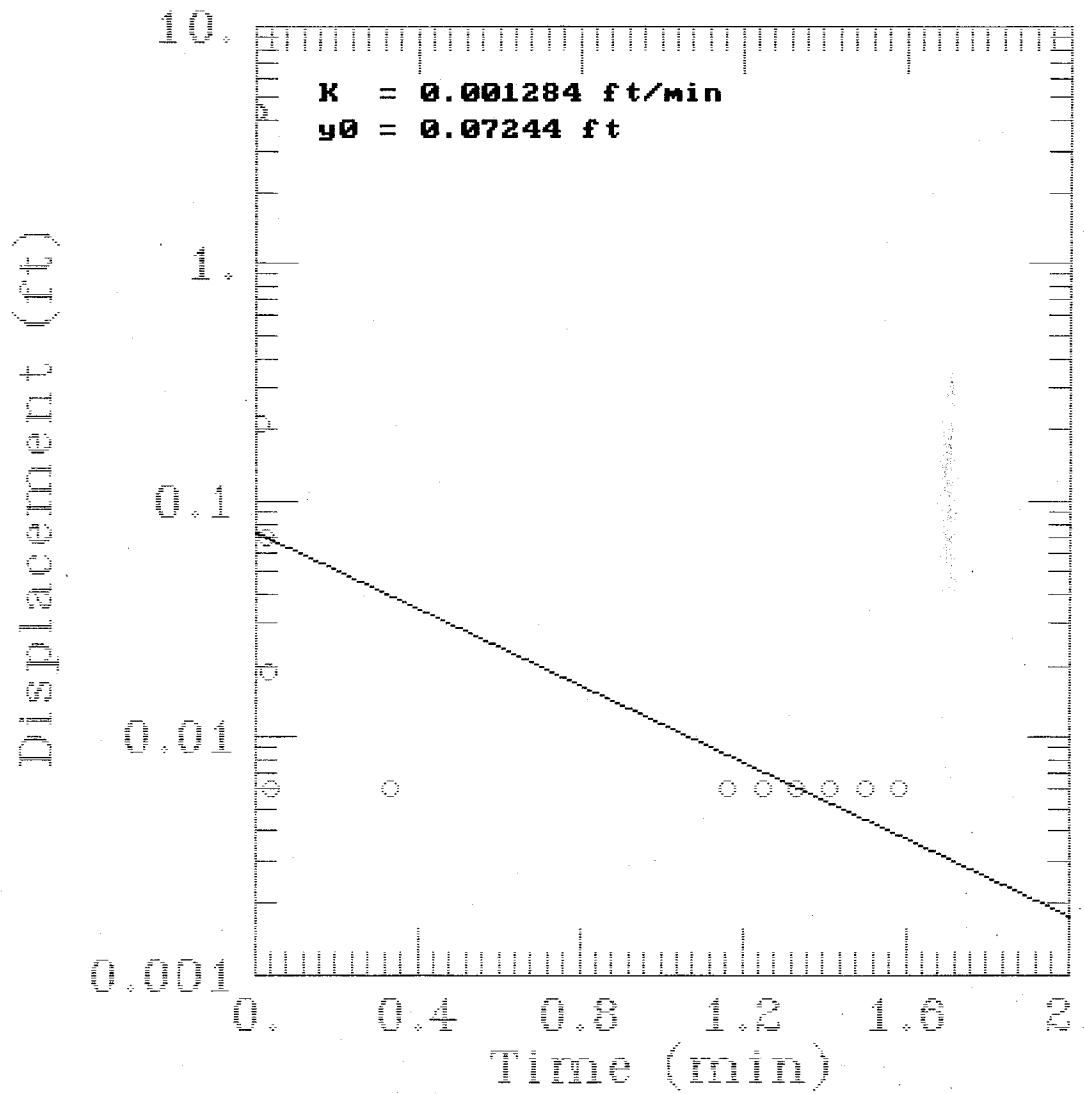
WHF-10-2 RUN #3



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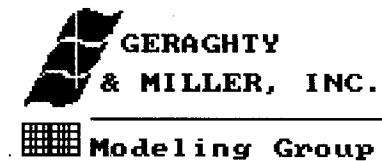
WHF-10-2 RUN #4



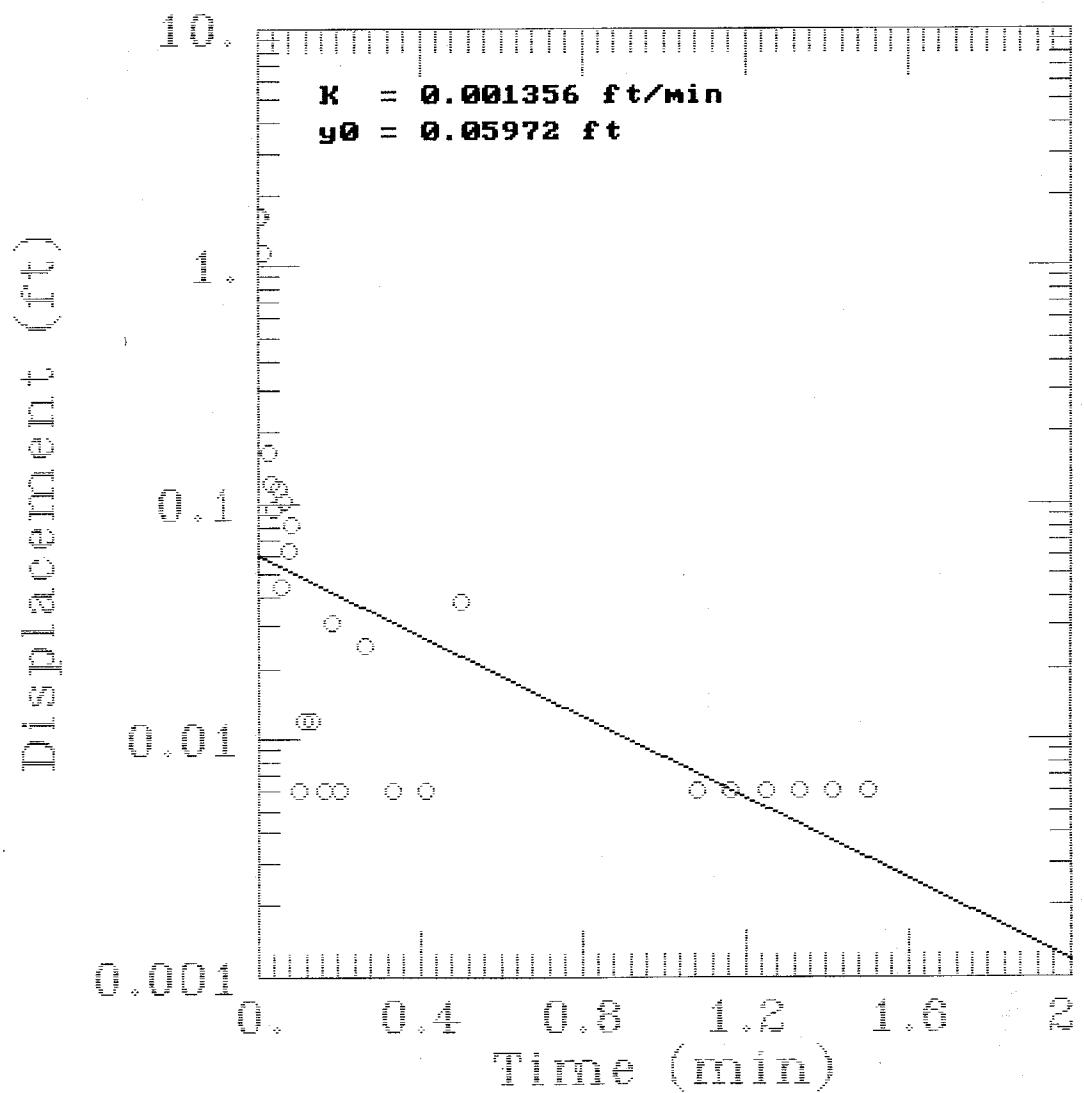
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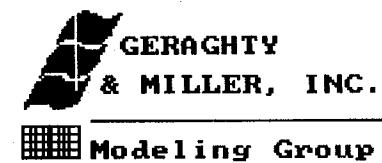
WHF-10-2 RUN #5



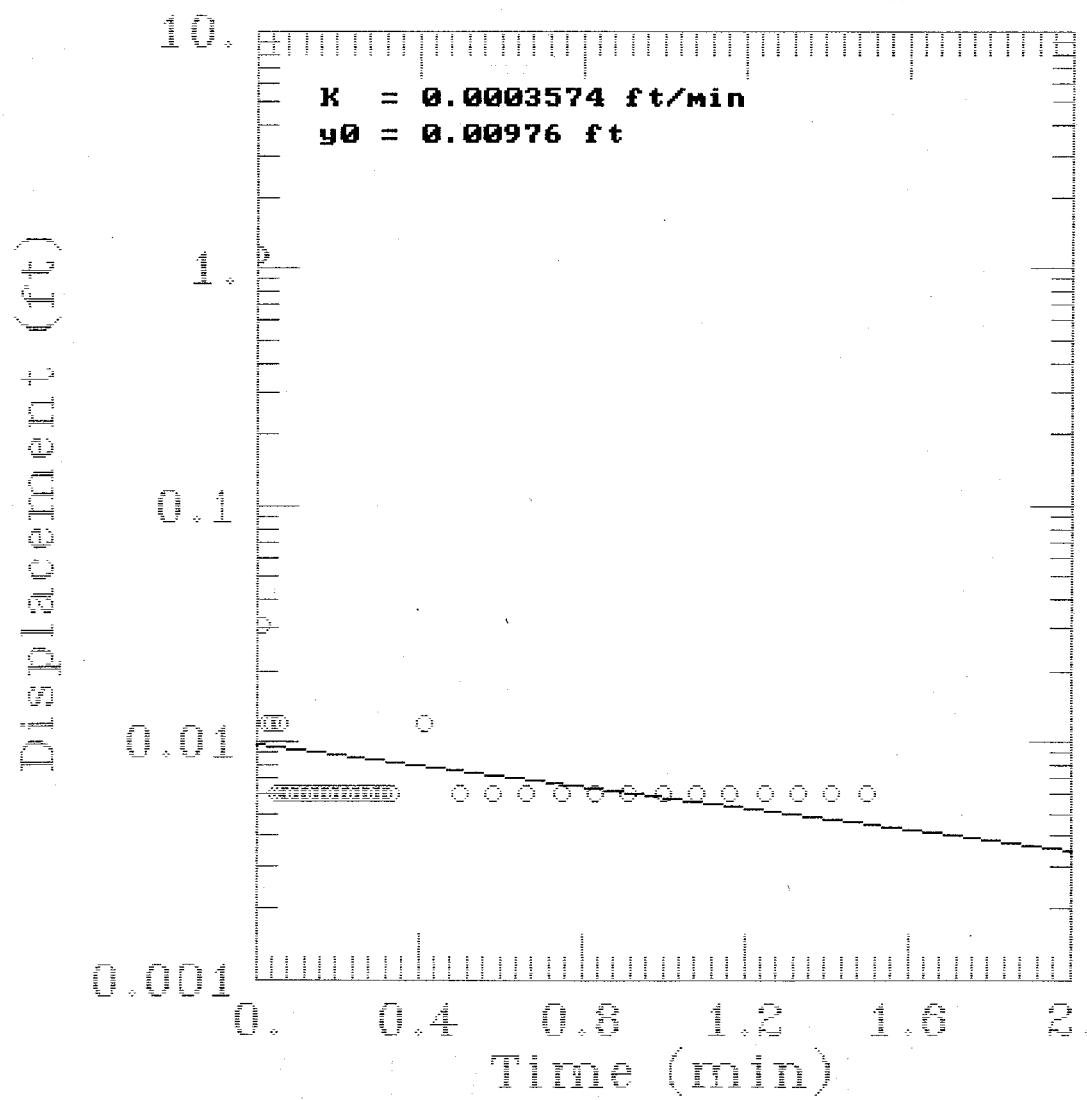
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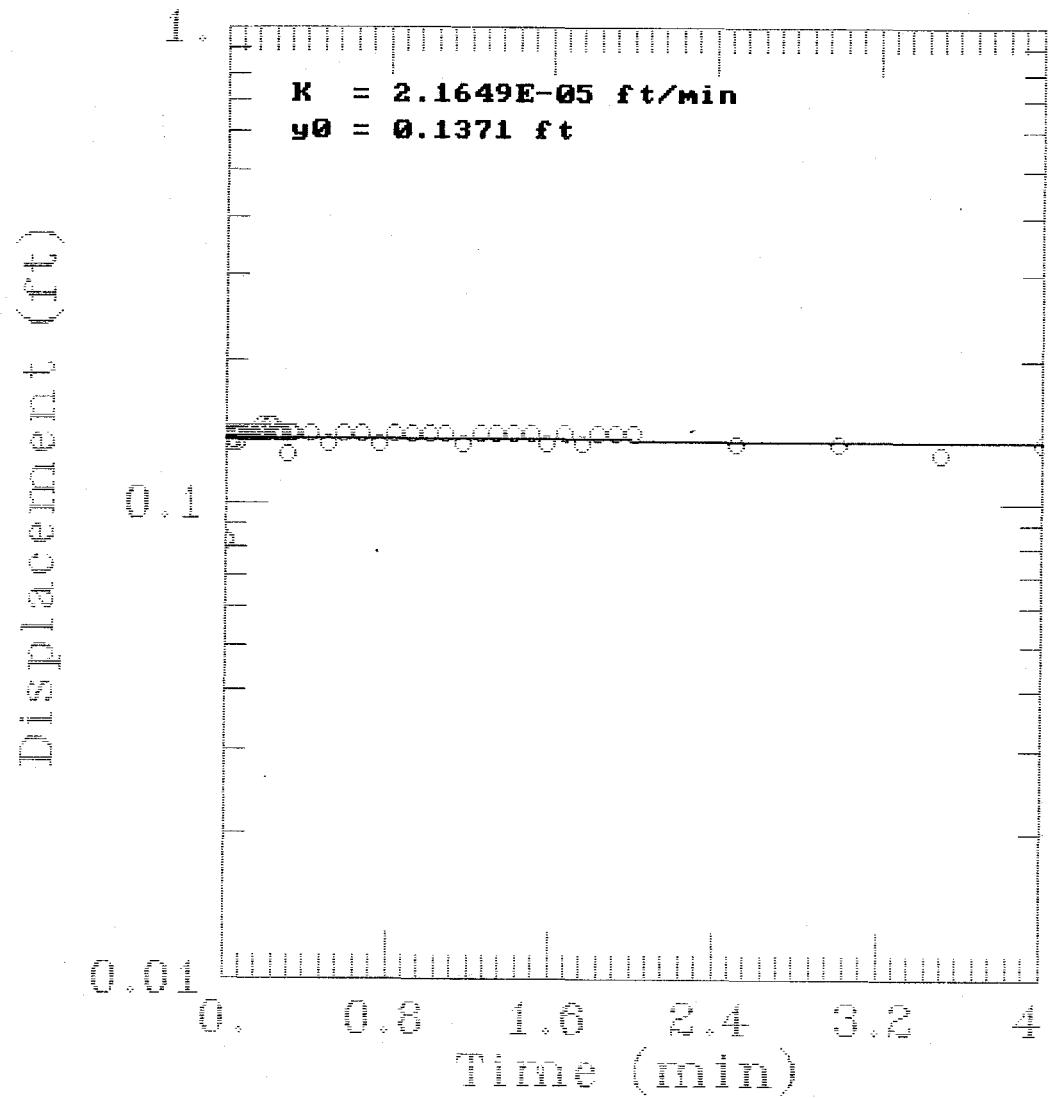
WHF-10-2 RUN #6



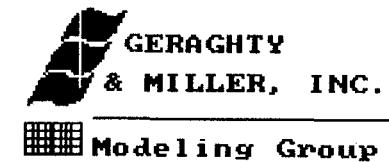
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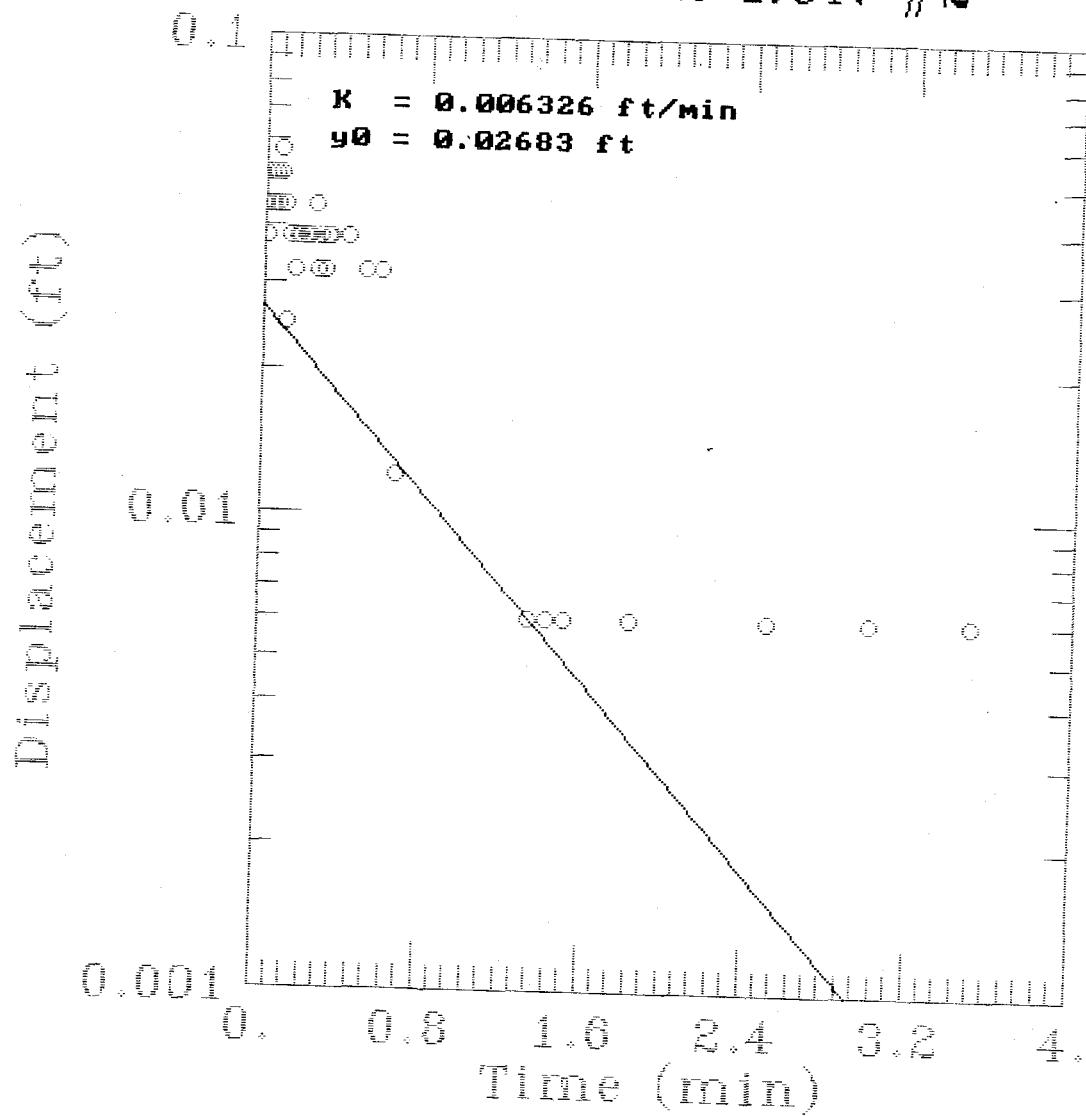
WHF-11-2 RUN #1



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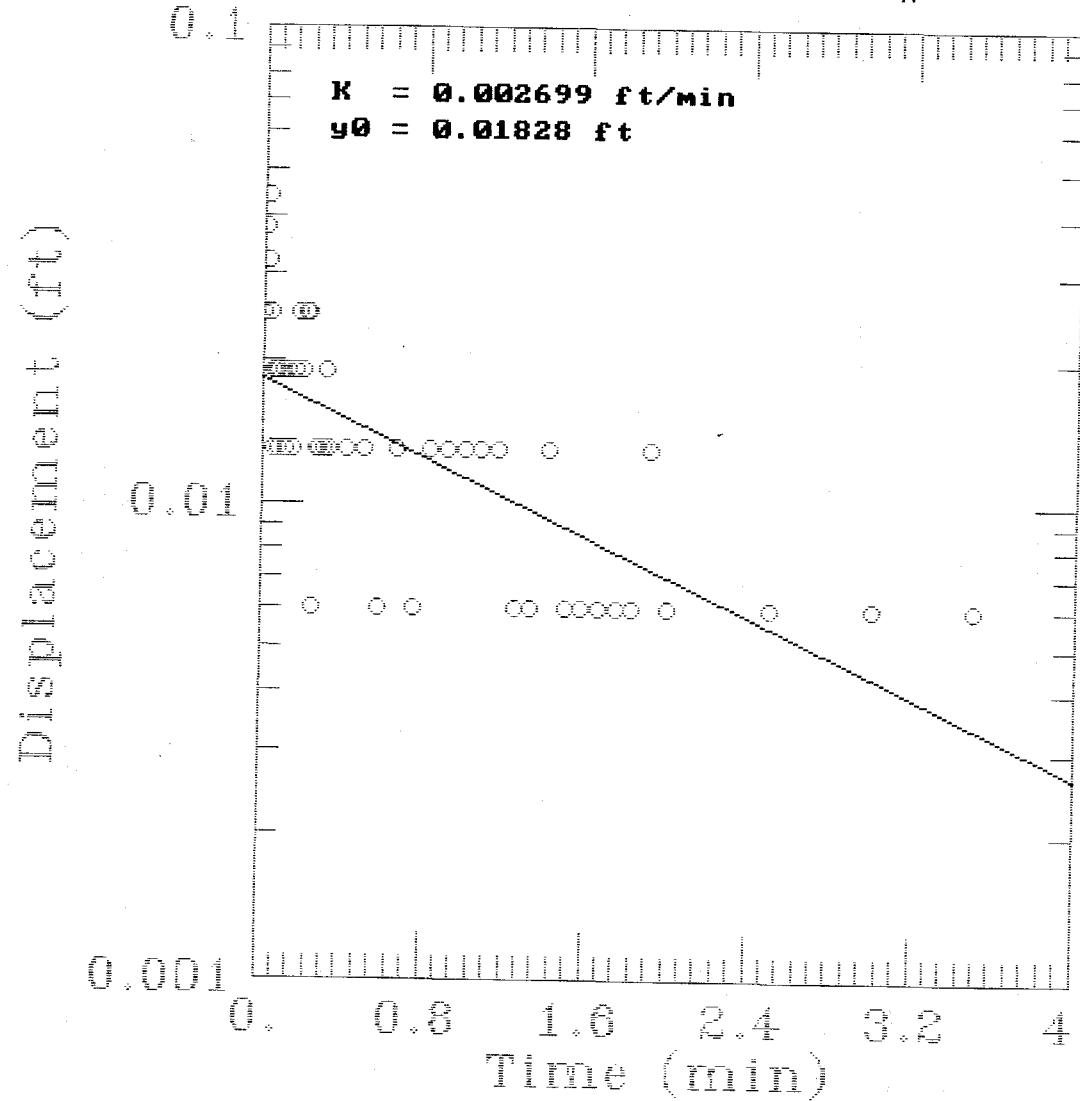
WHF-11-2 RUN #2



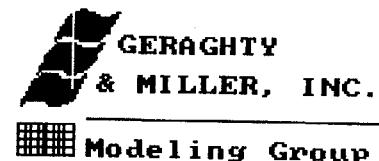
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WHF-11-2 RUN #3



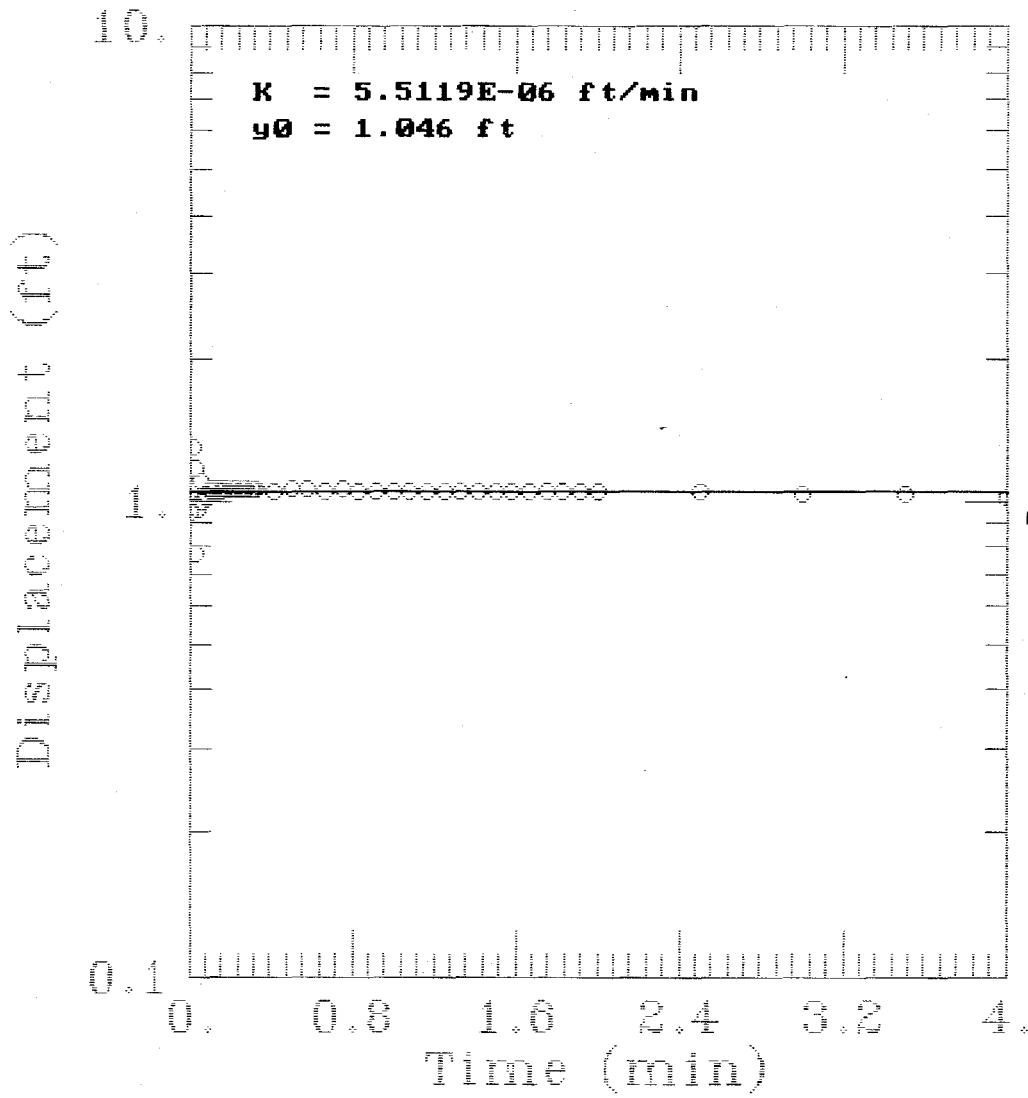
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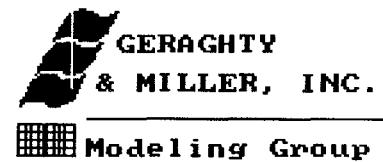
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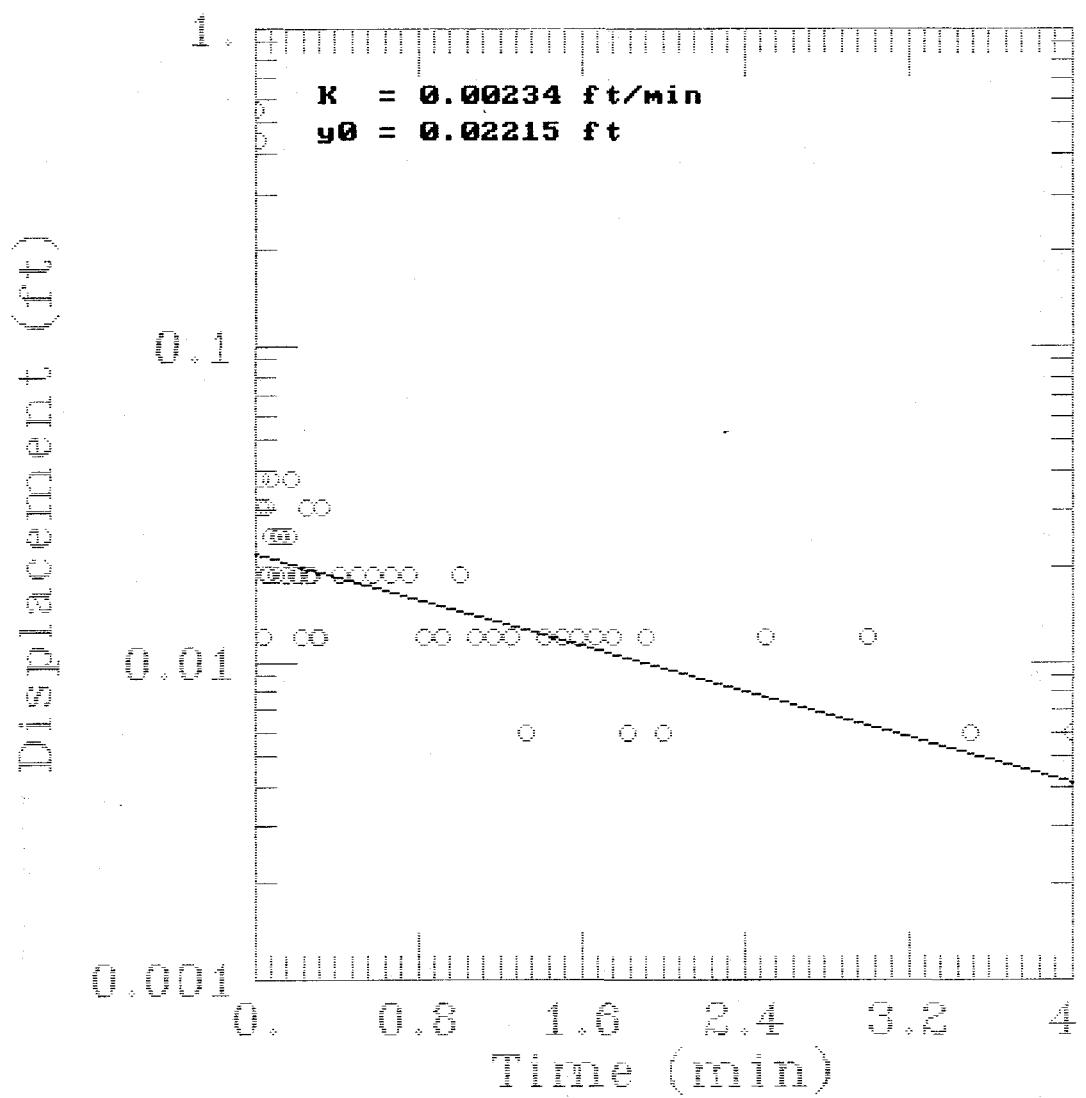
WHF-11-2 RUN #4



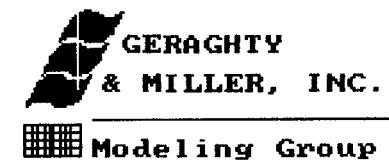
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WHF-11-2 RUN #5



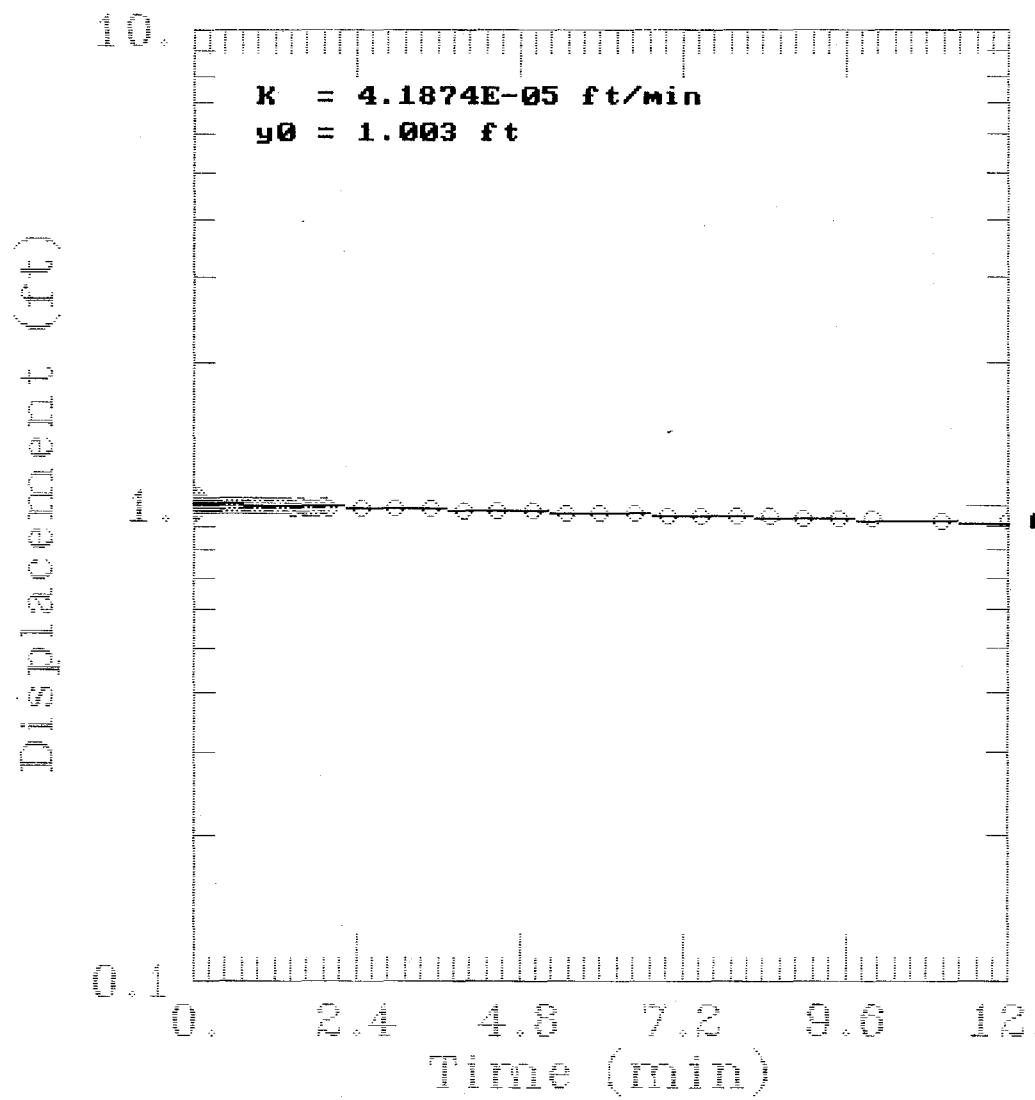
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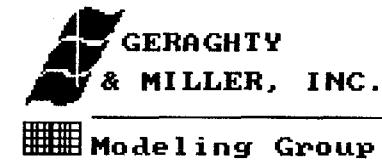
WHF-11-2 RUN#6



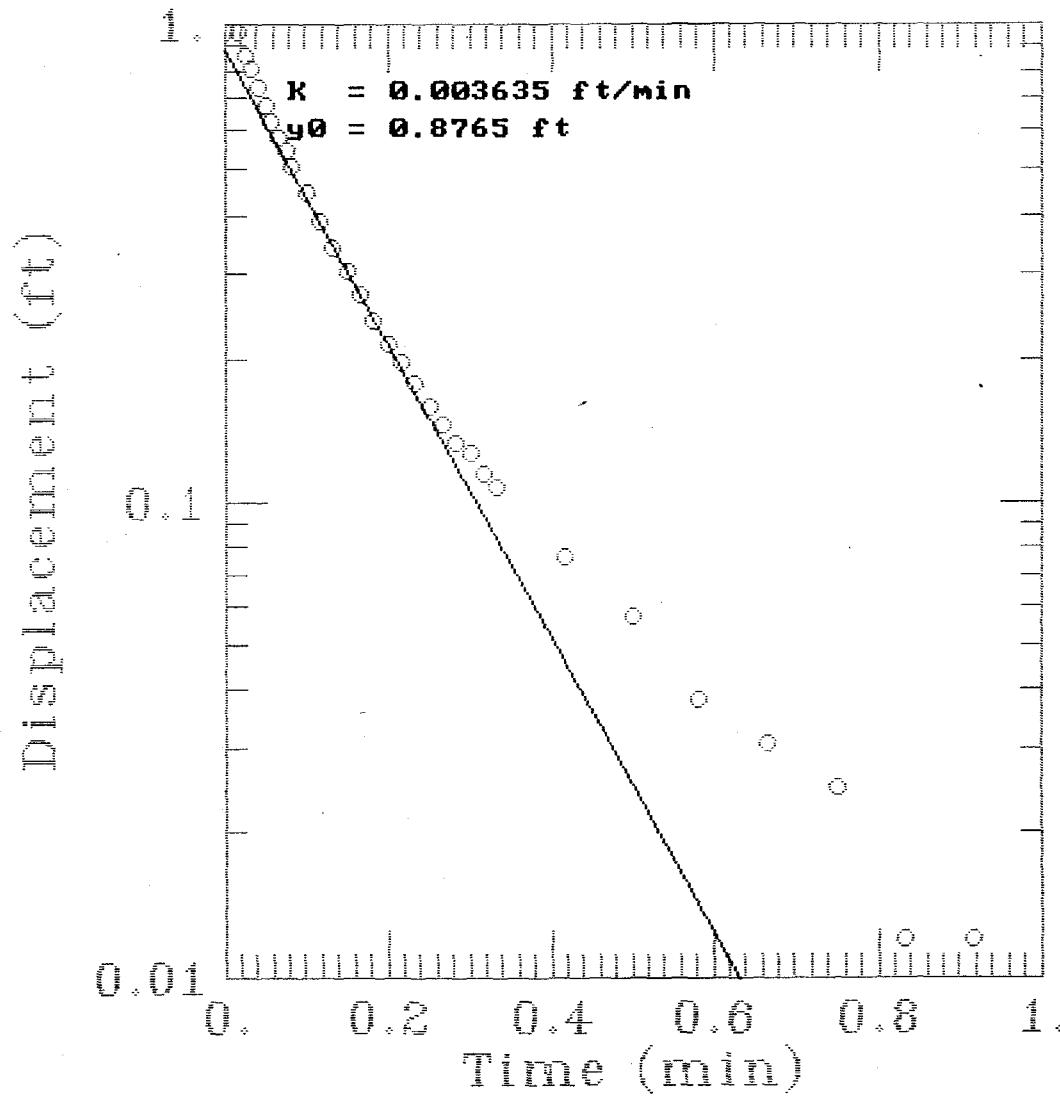
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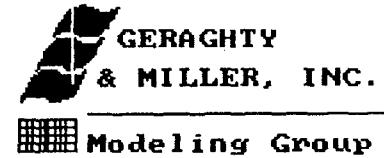
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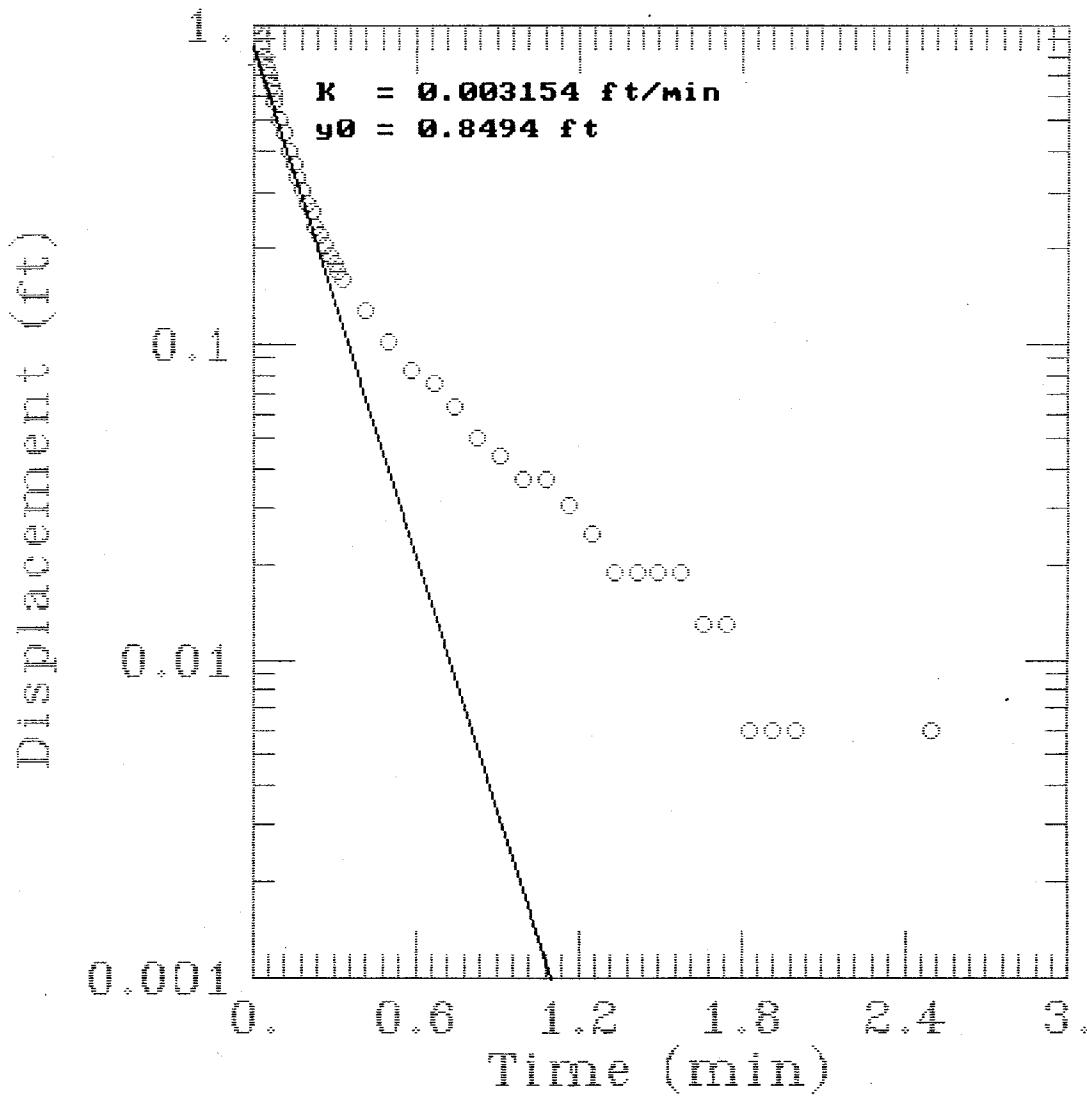
WHF-11-3 RUN #1



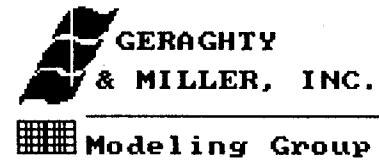
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WHF-11-3 RUN #2



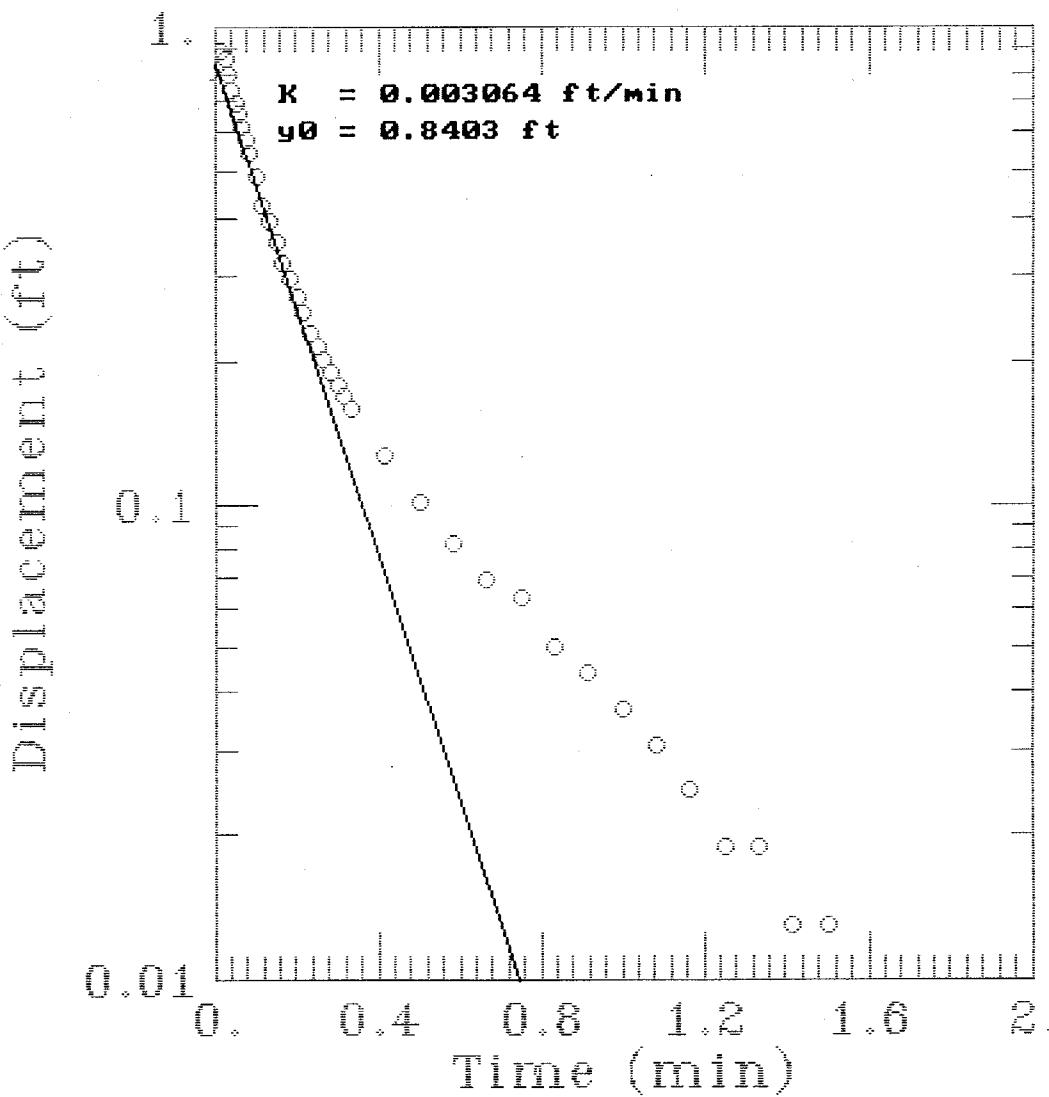
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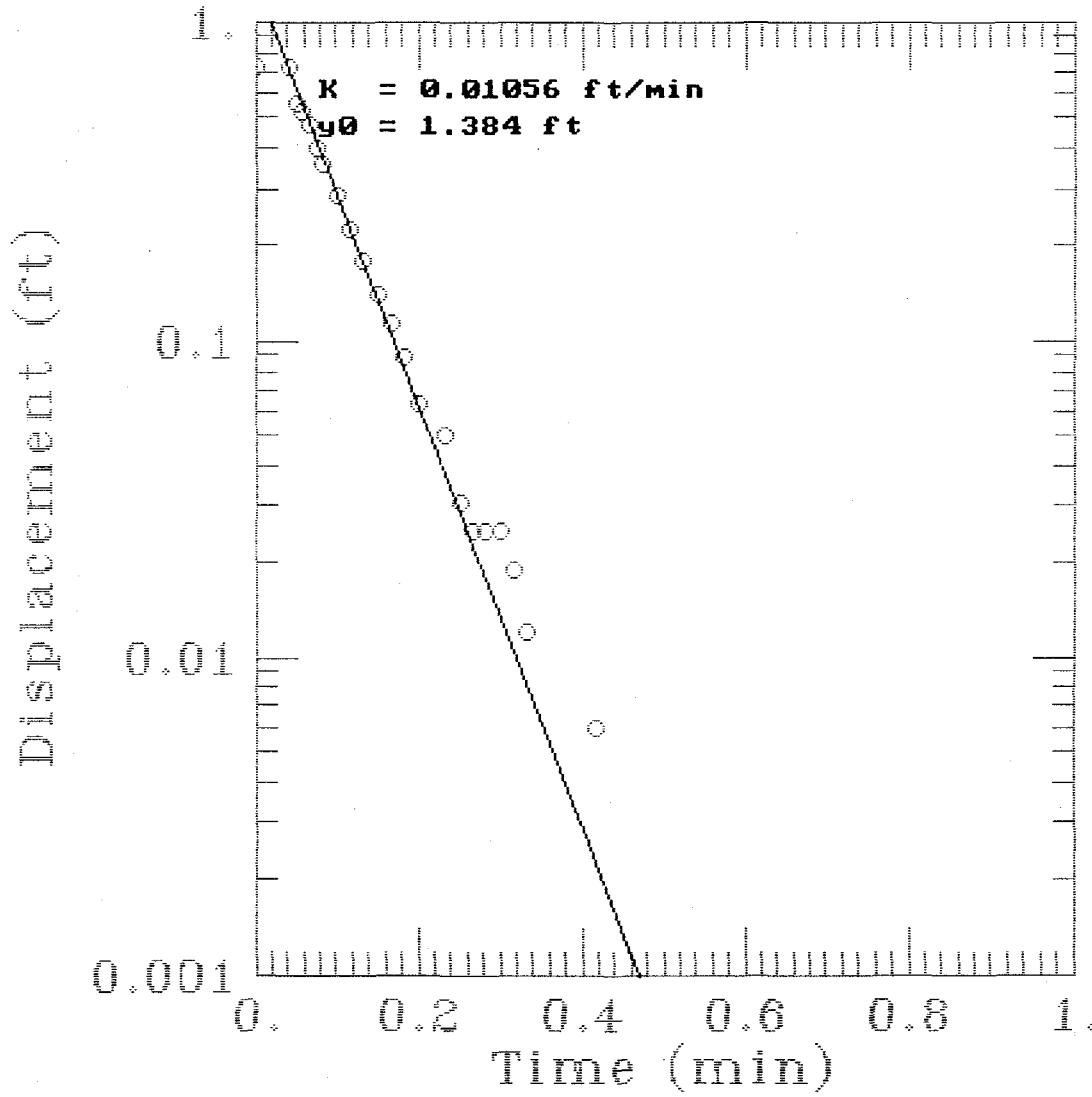
WHF-11-3 RUN #3



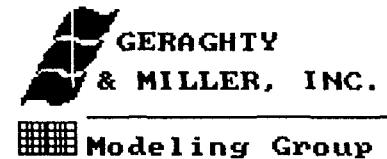
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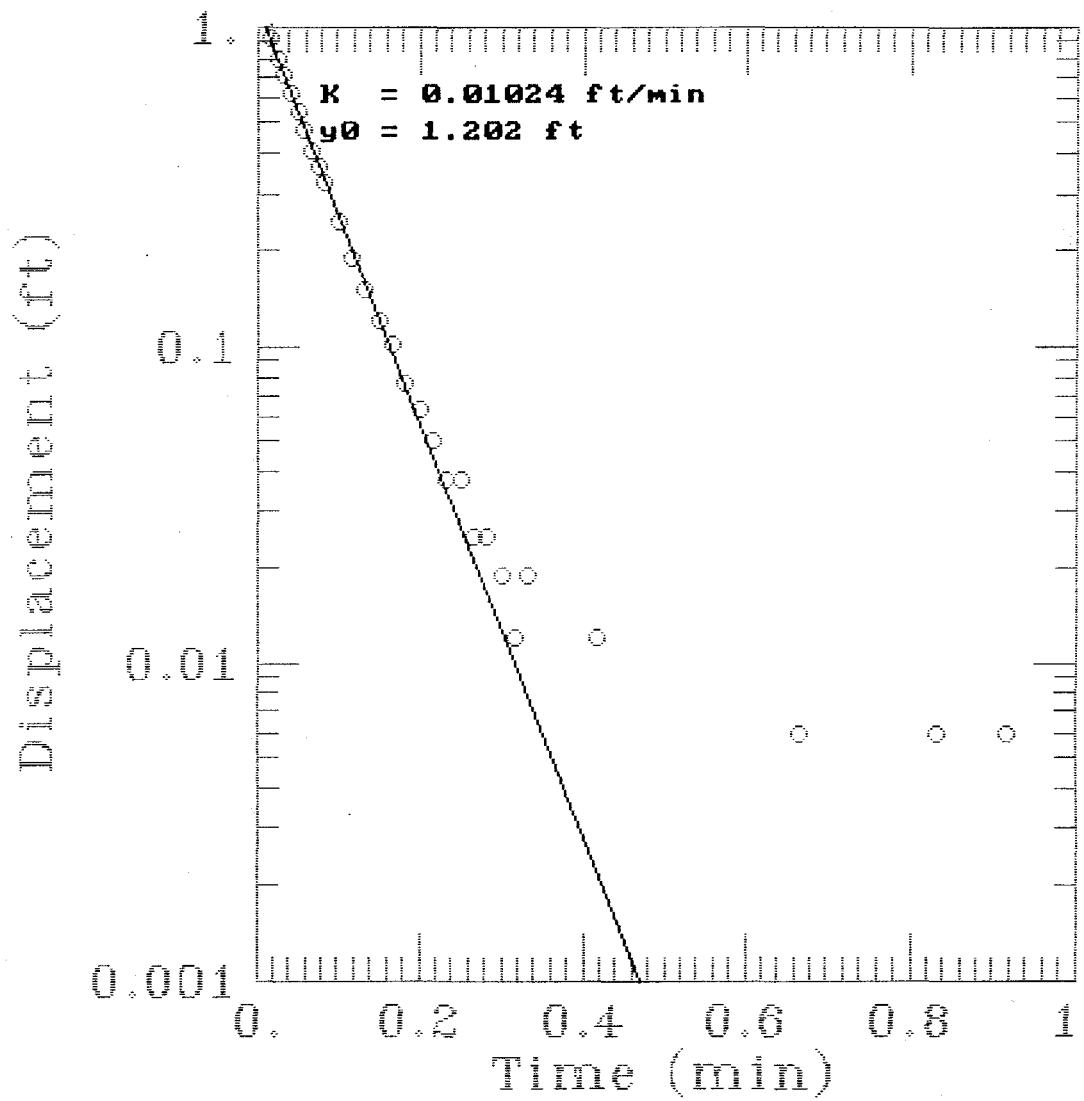
WHF-13-2S RUN #1



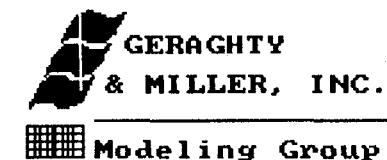
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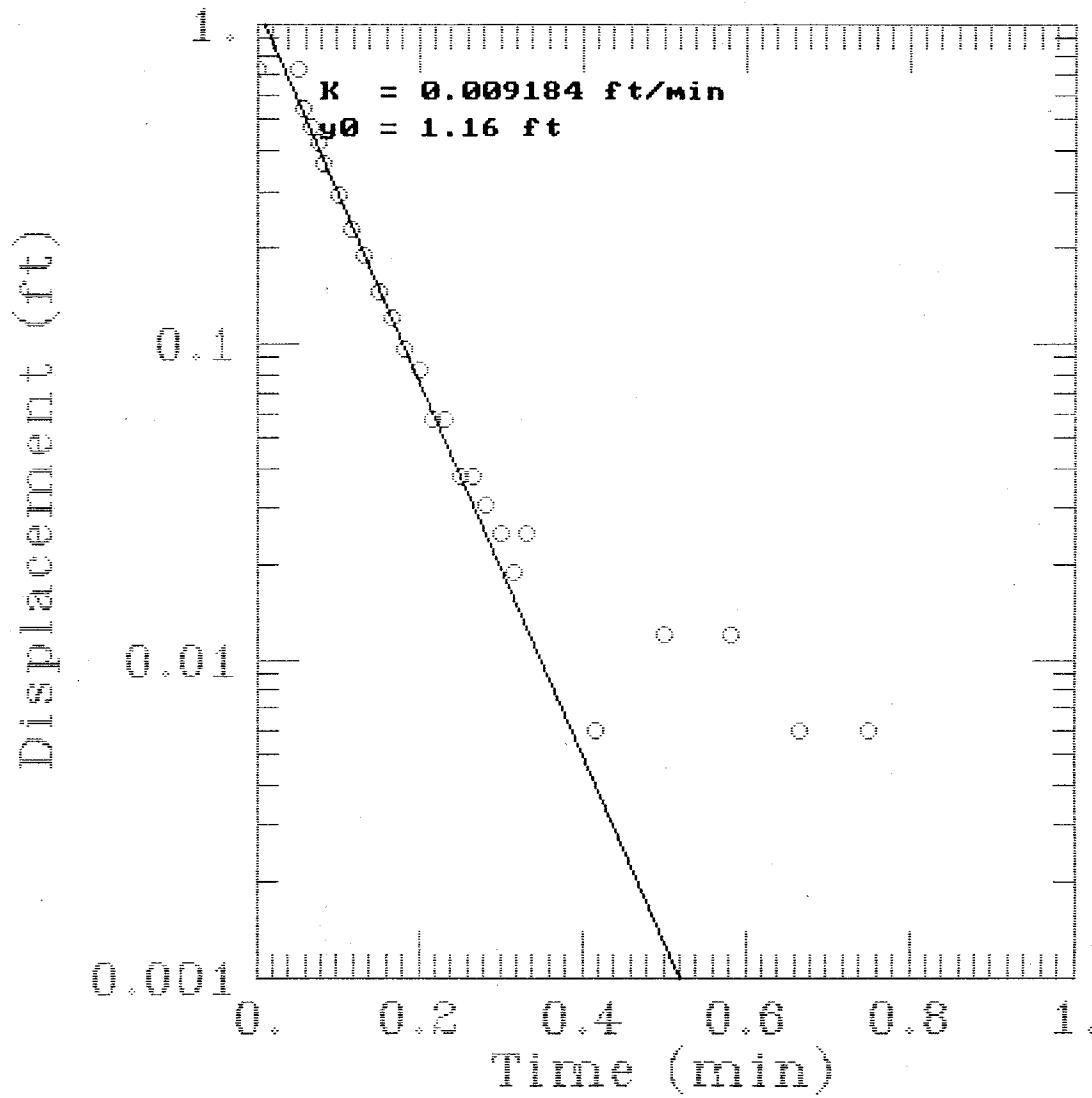
WHF-13-2S RUN #2



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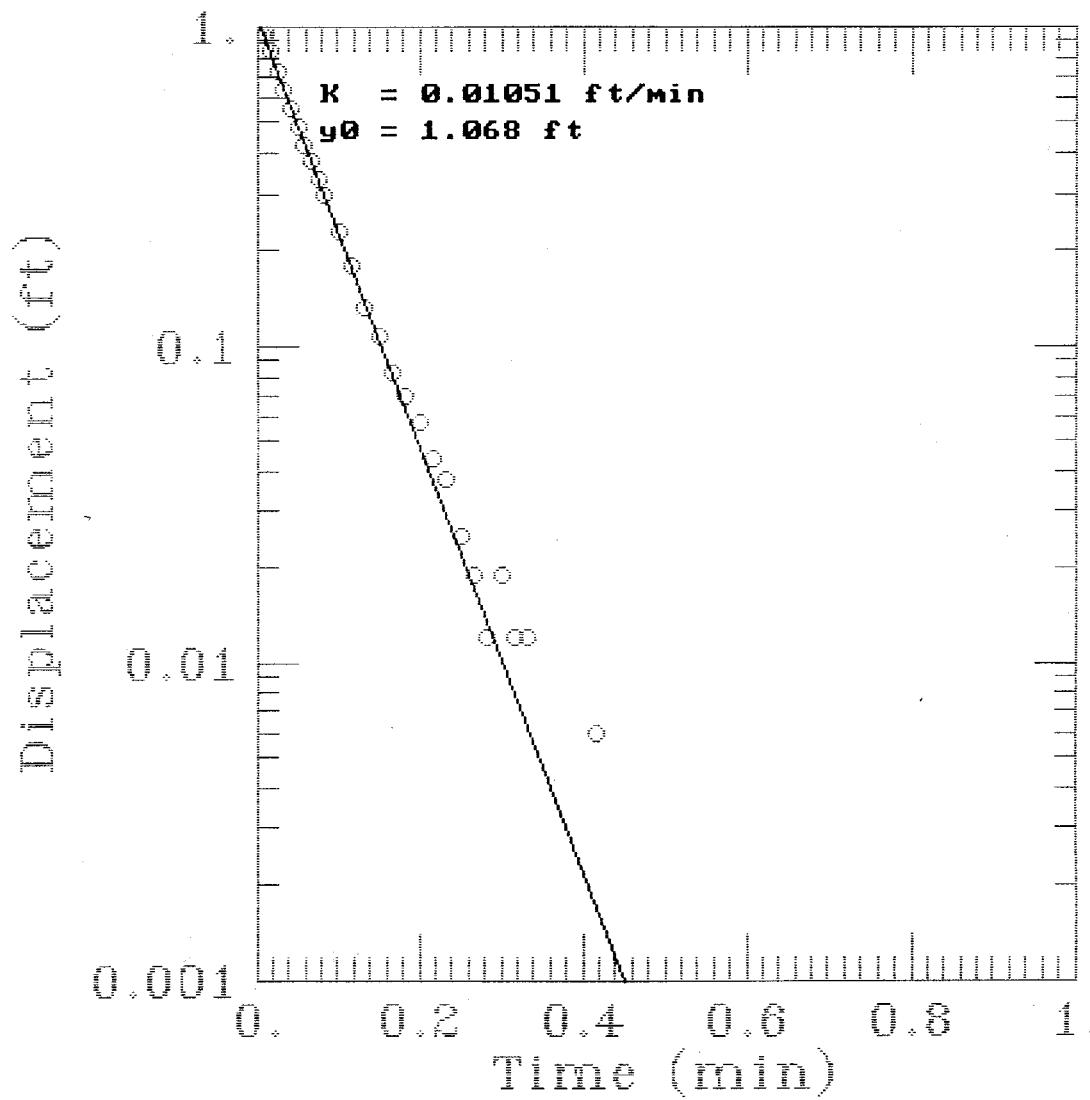


WHF-13-2S RUN #3

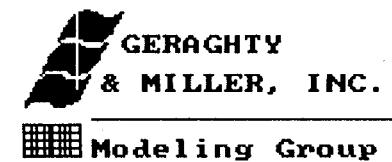


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WHF-13-2S RUN #4

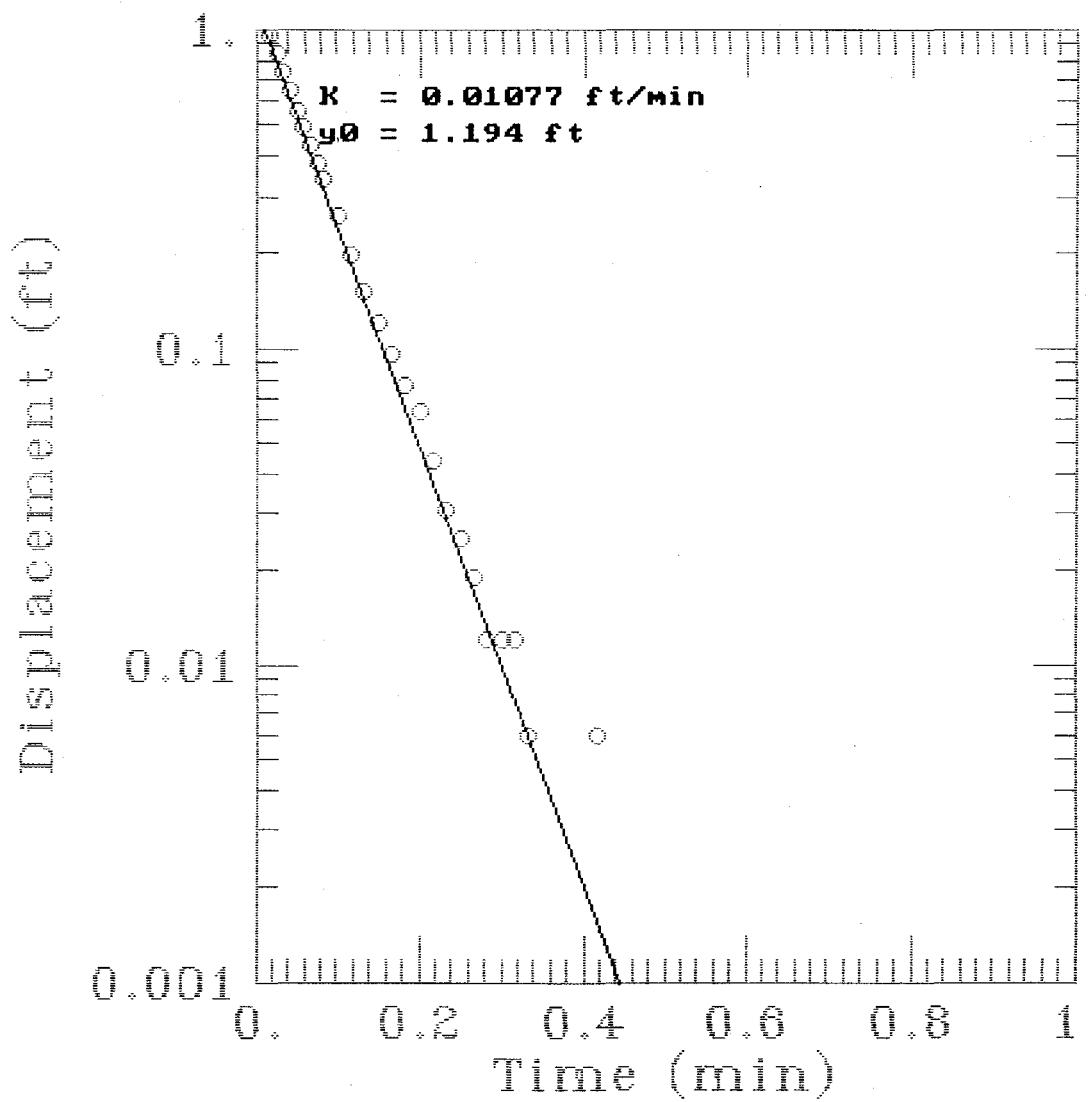


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WHF-13-2S RUN #5

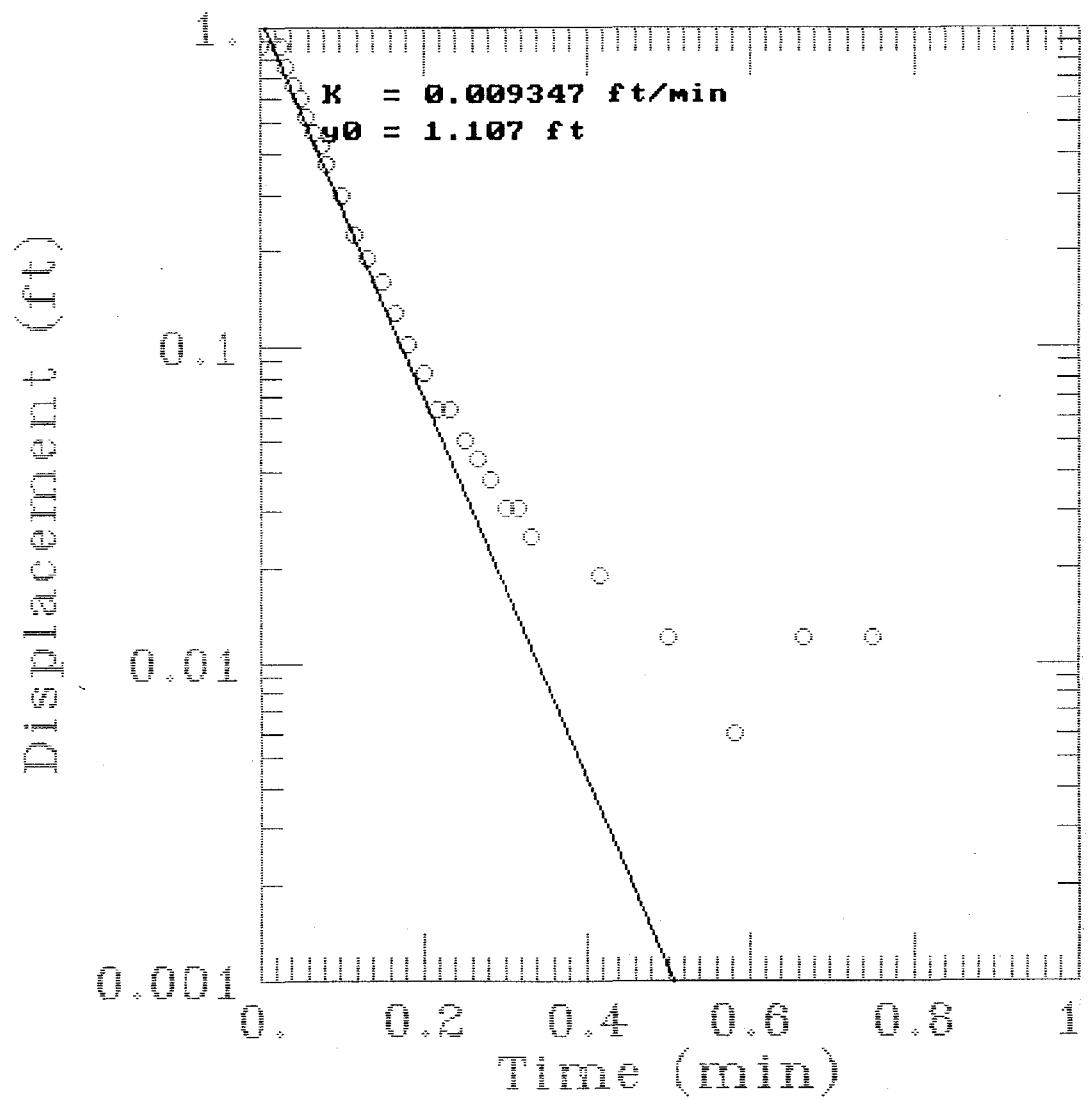


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Modeling Group

WHF-13-2S RUN #6



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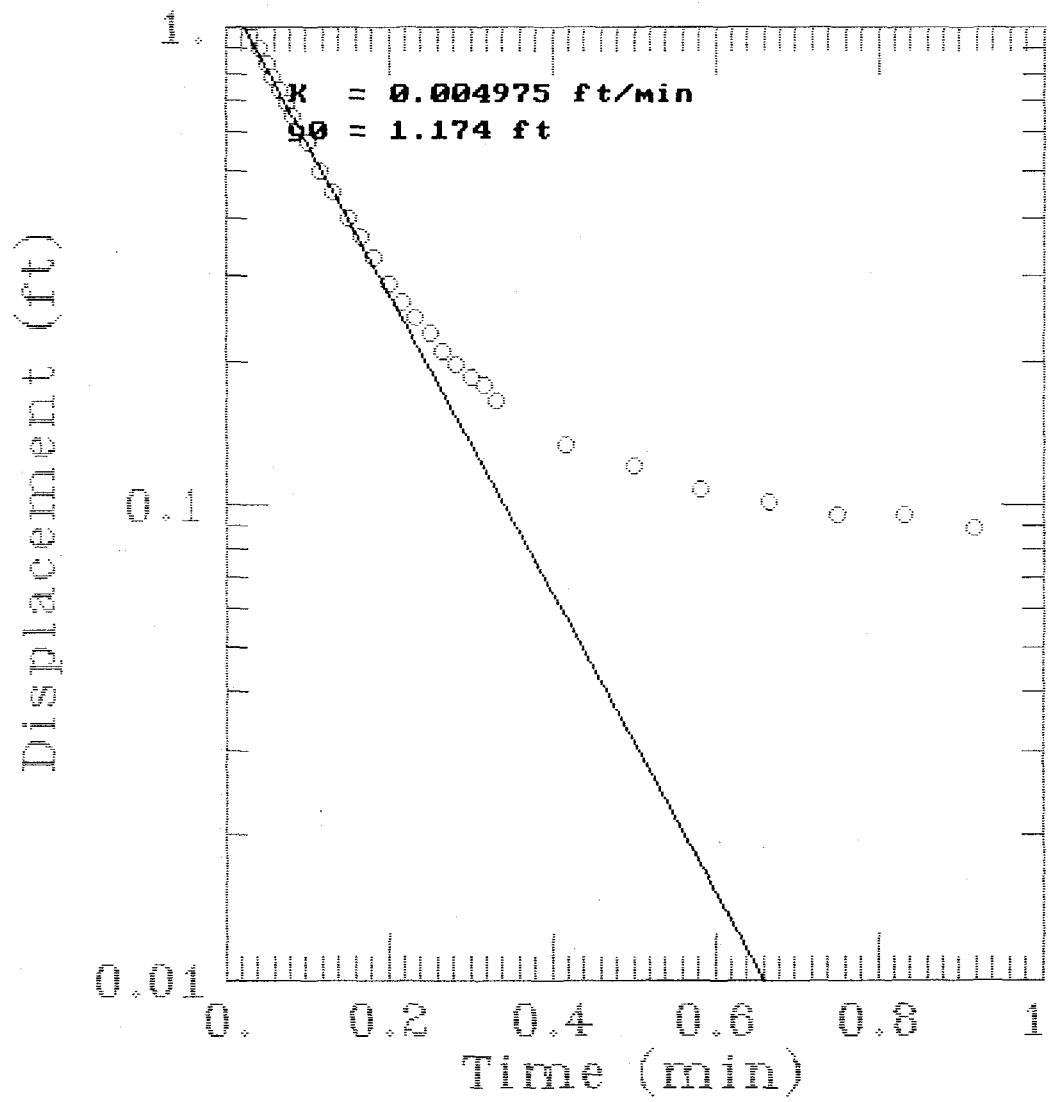


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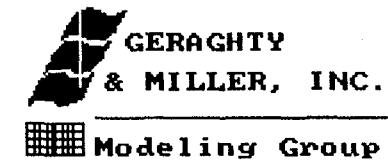


Modeling Group

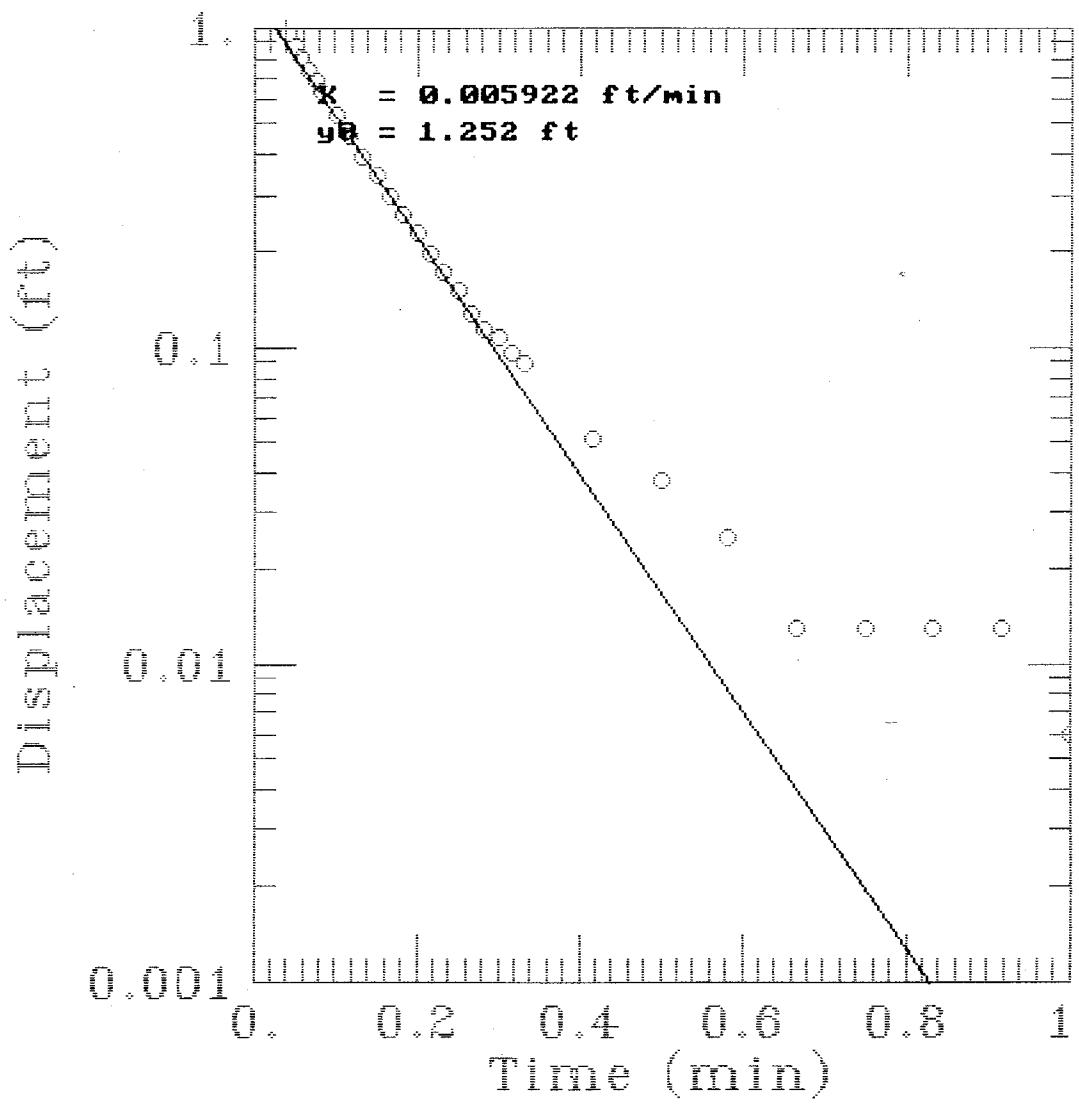
WHF-14-2 RUN #1



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WHF-14-2 RUN #2



AQTESOLV

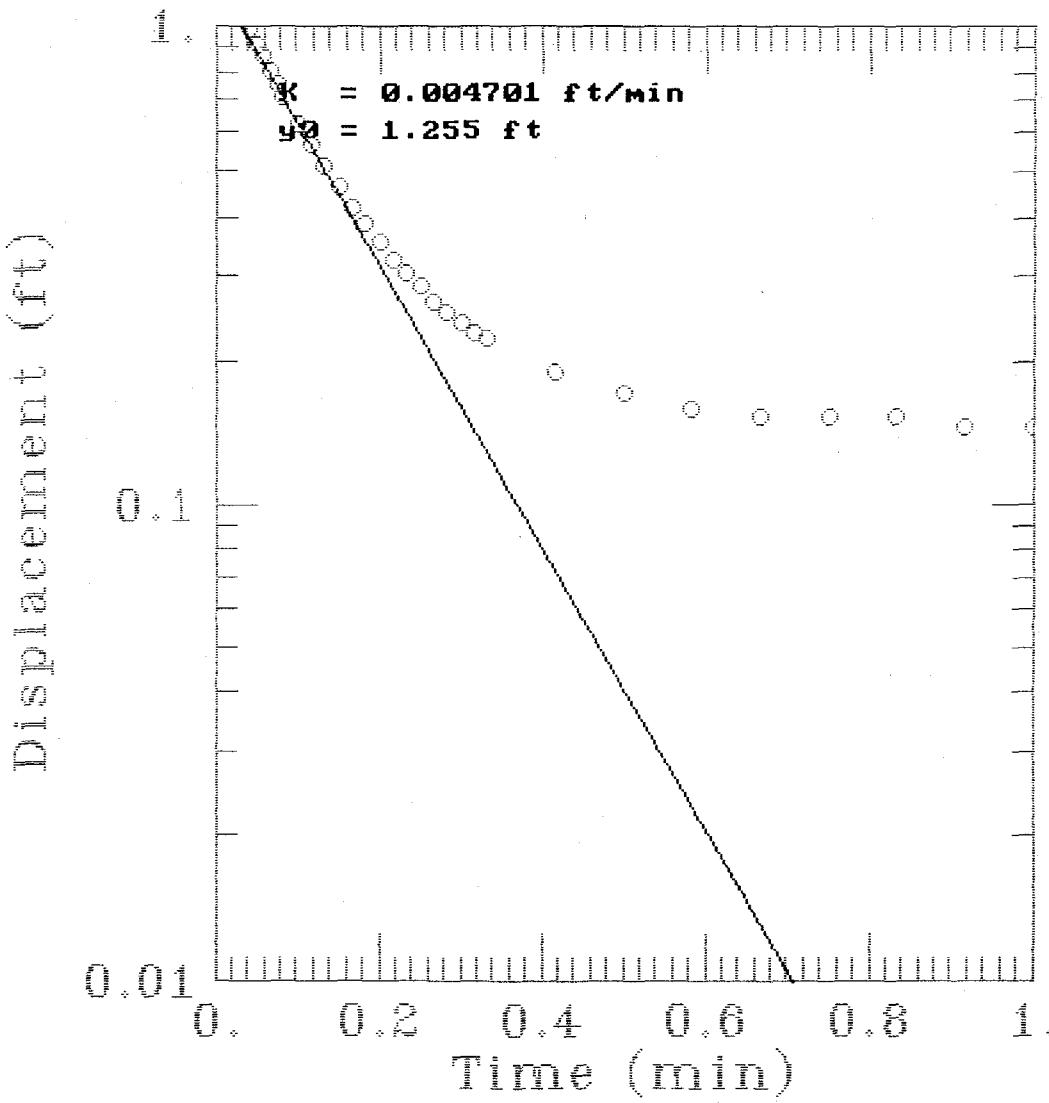


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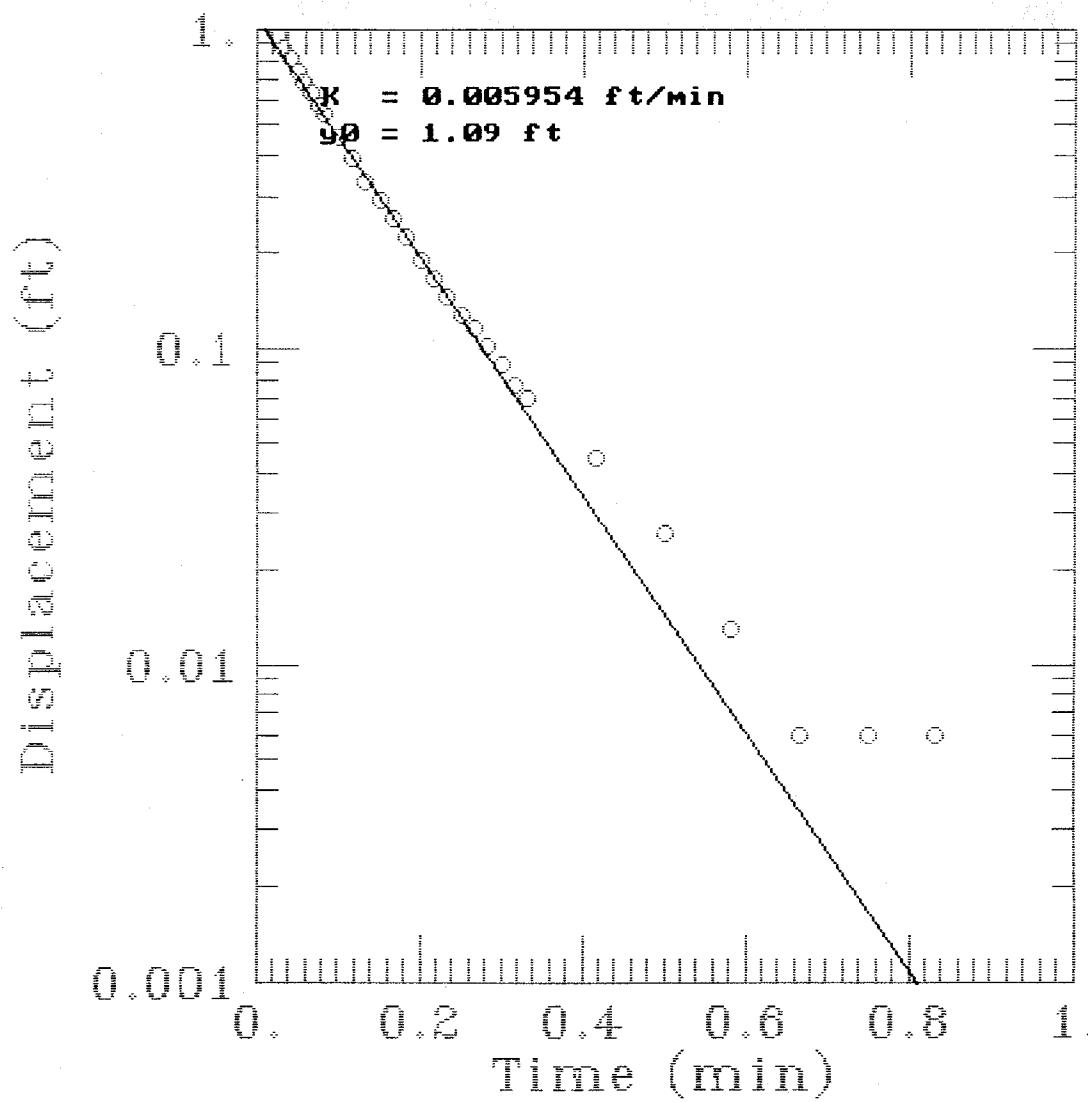
Modeling Group

WHF-14-2 RUN #3



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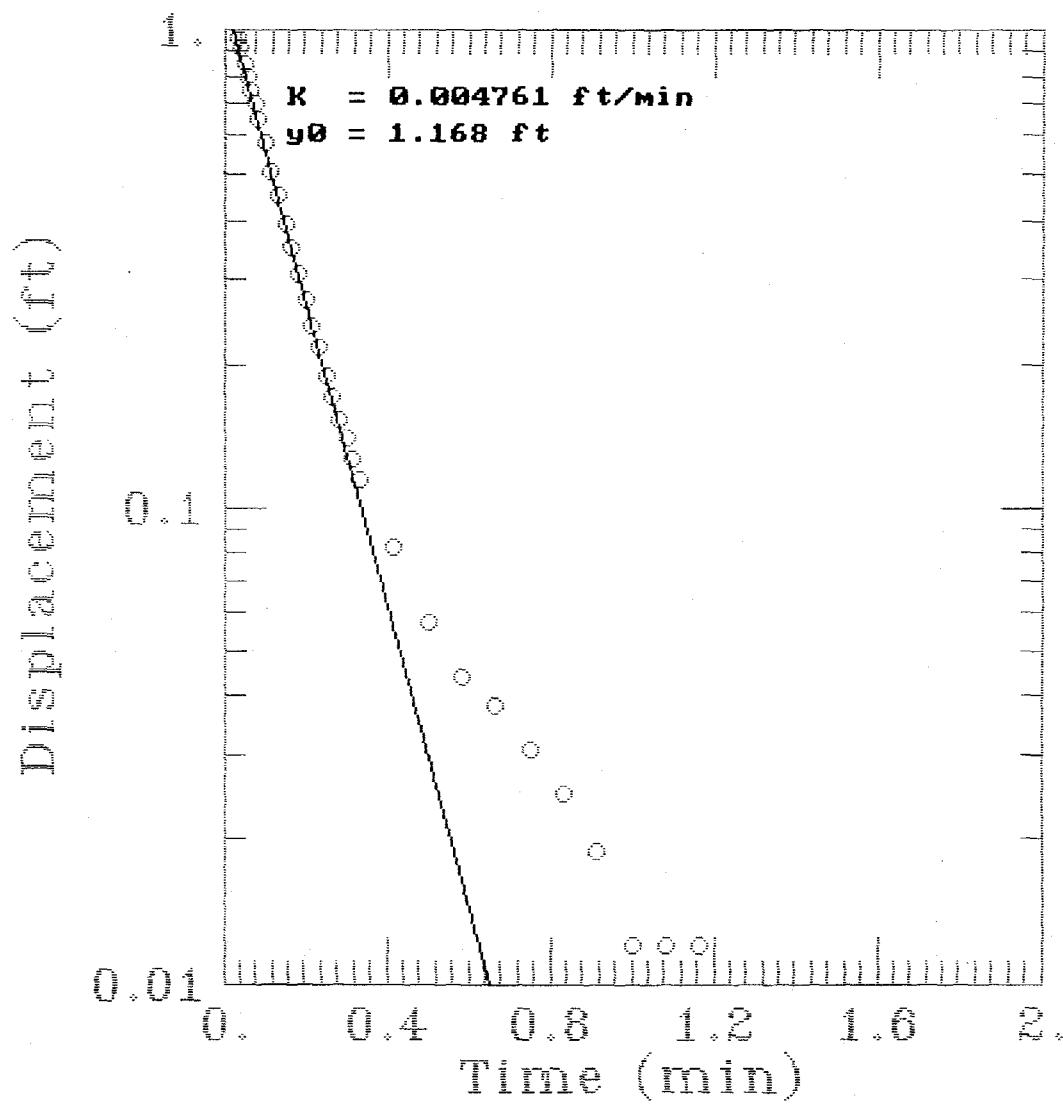
WHF-14-2 RUN #4



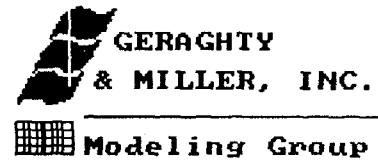
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WHF-15-2S RUN #1

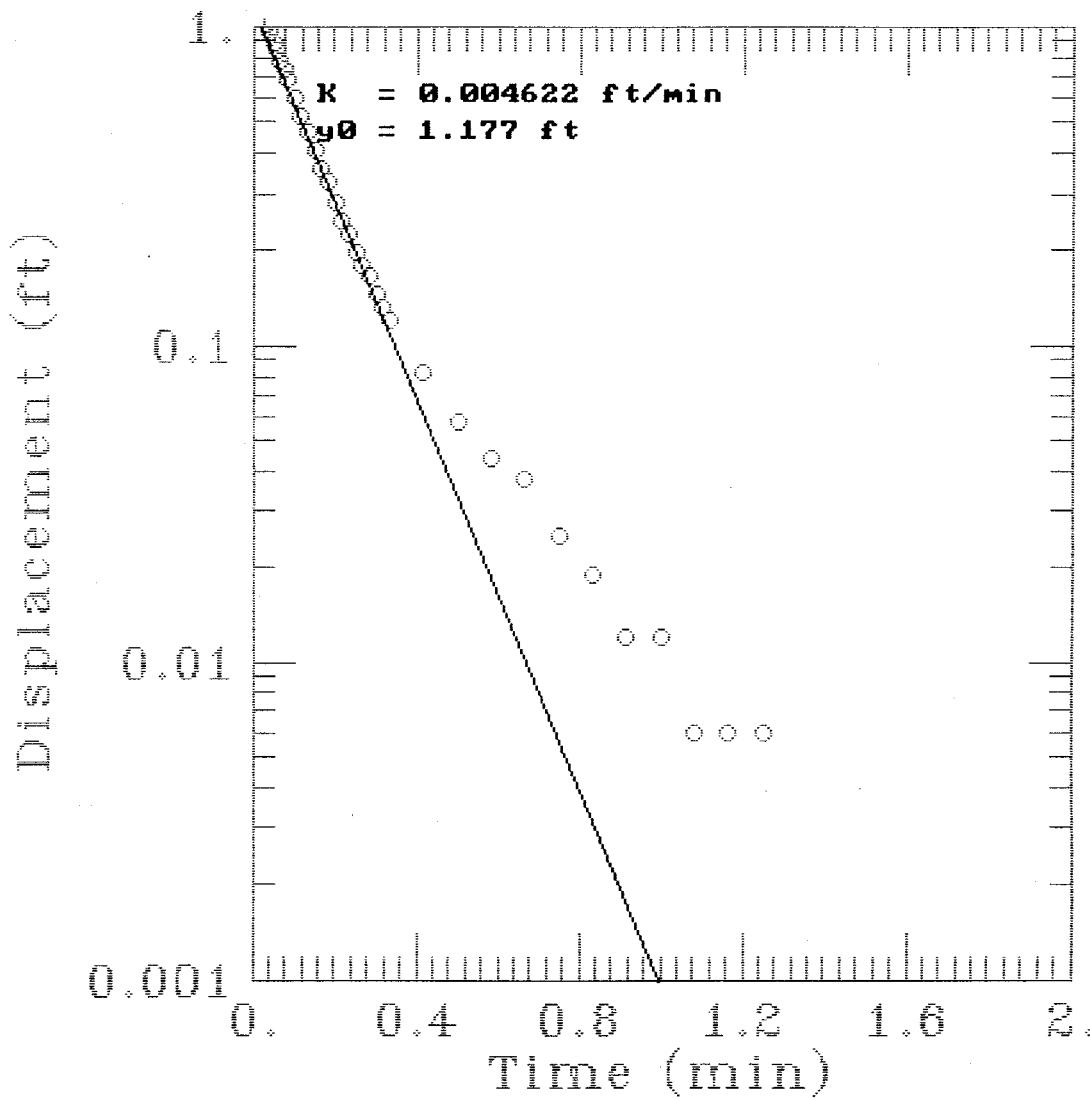


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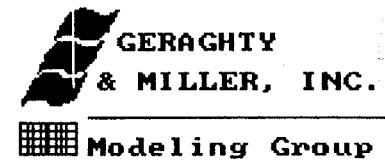


Modeling Group

WHF-15-2S RUN #2

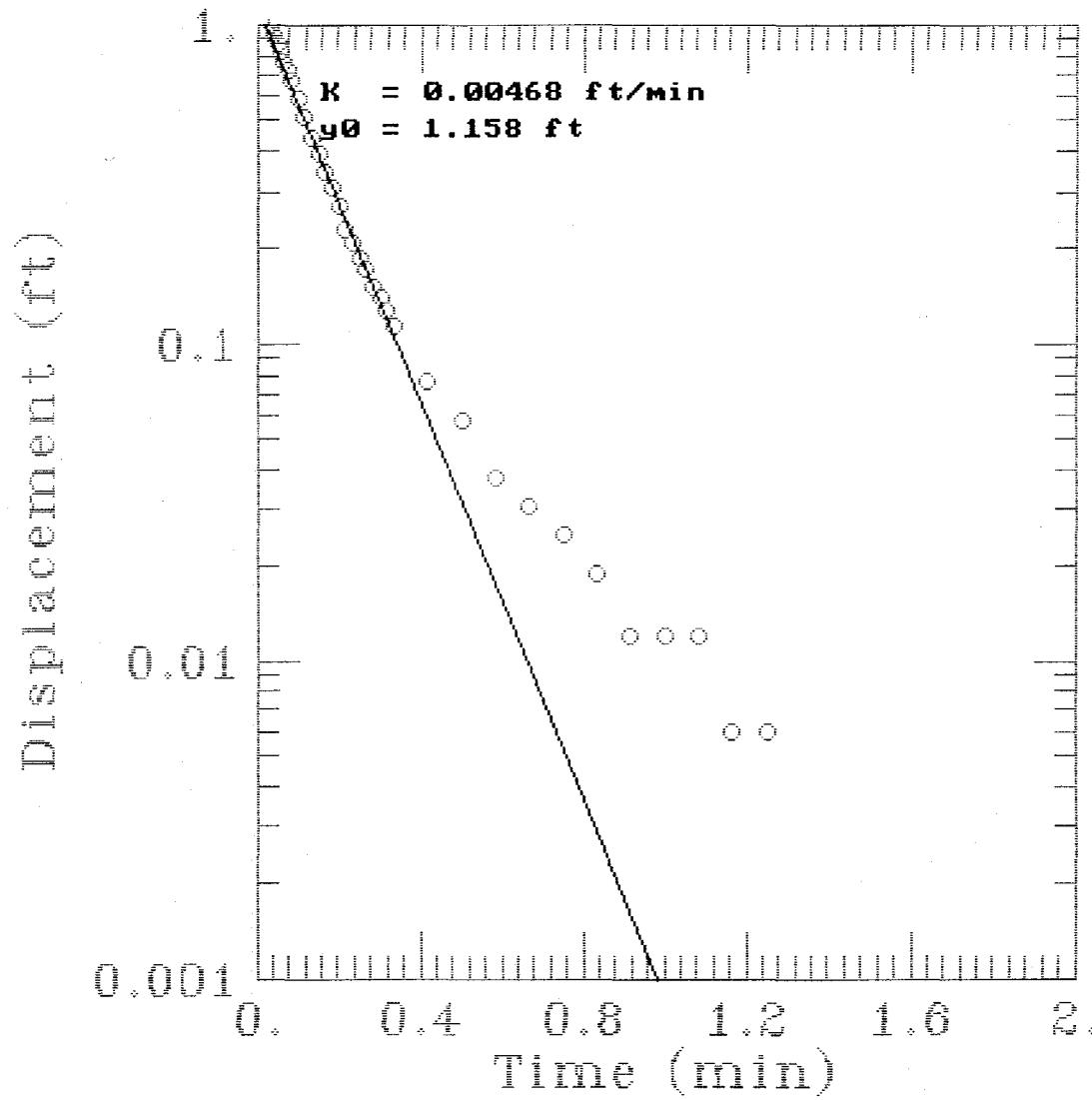


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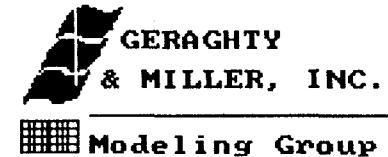


Modeling Group

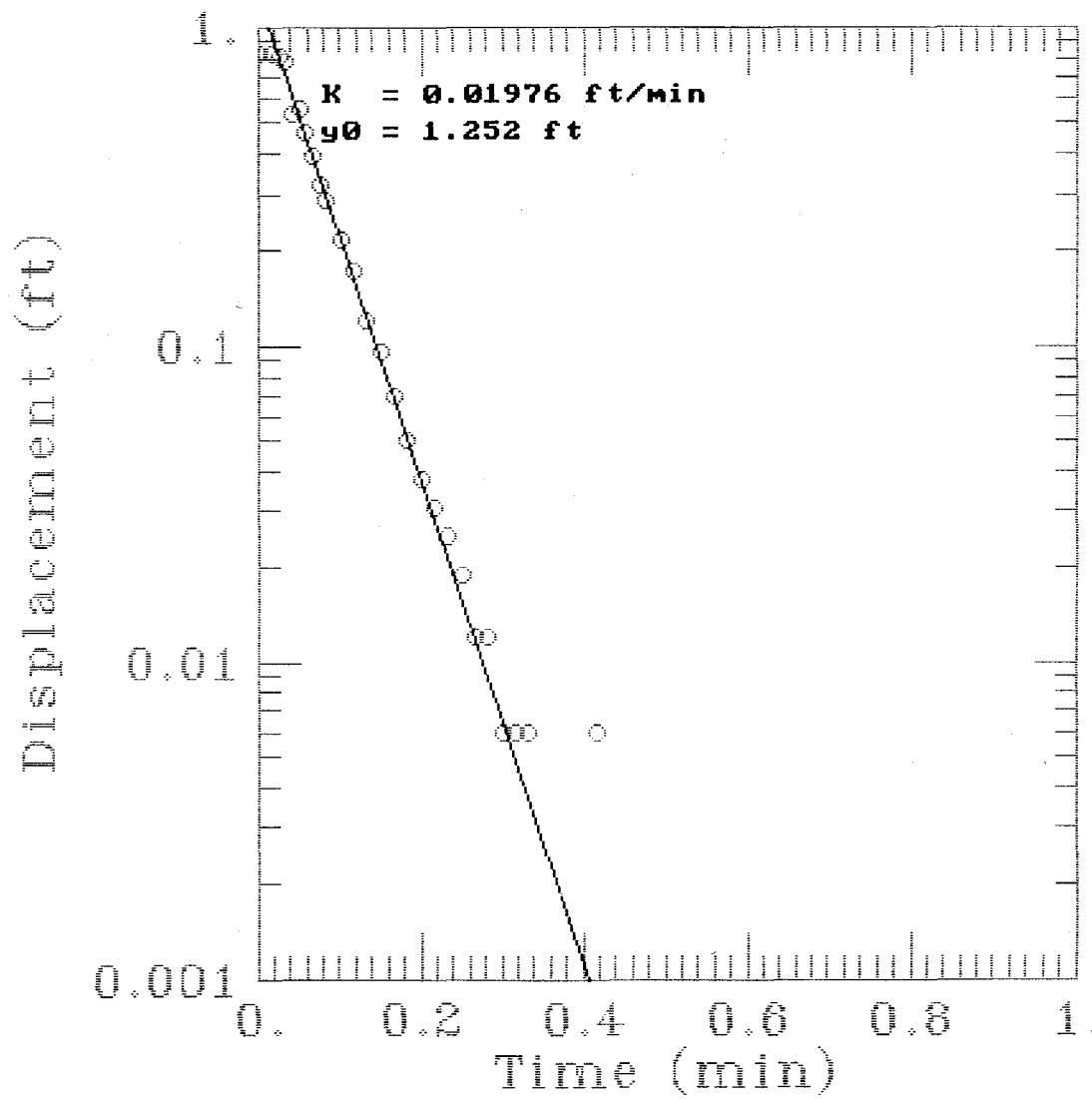
WHF-15-2S RUN #3



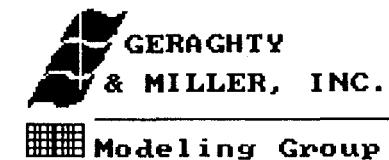
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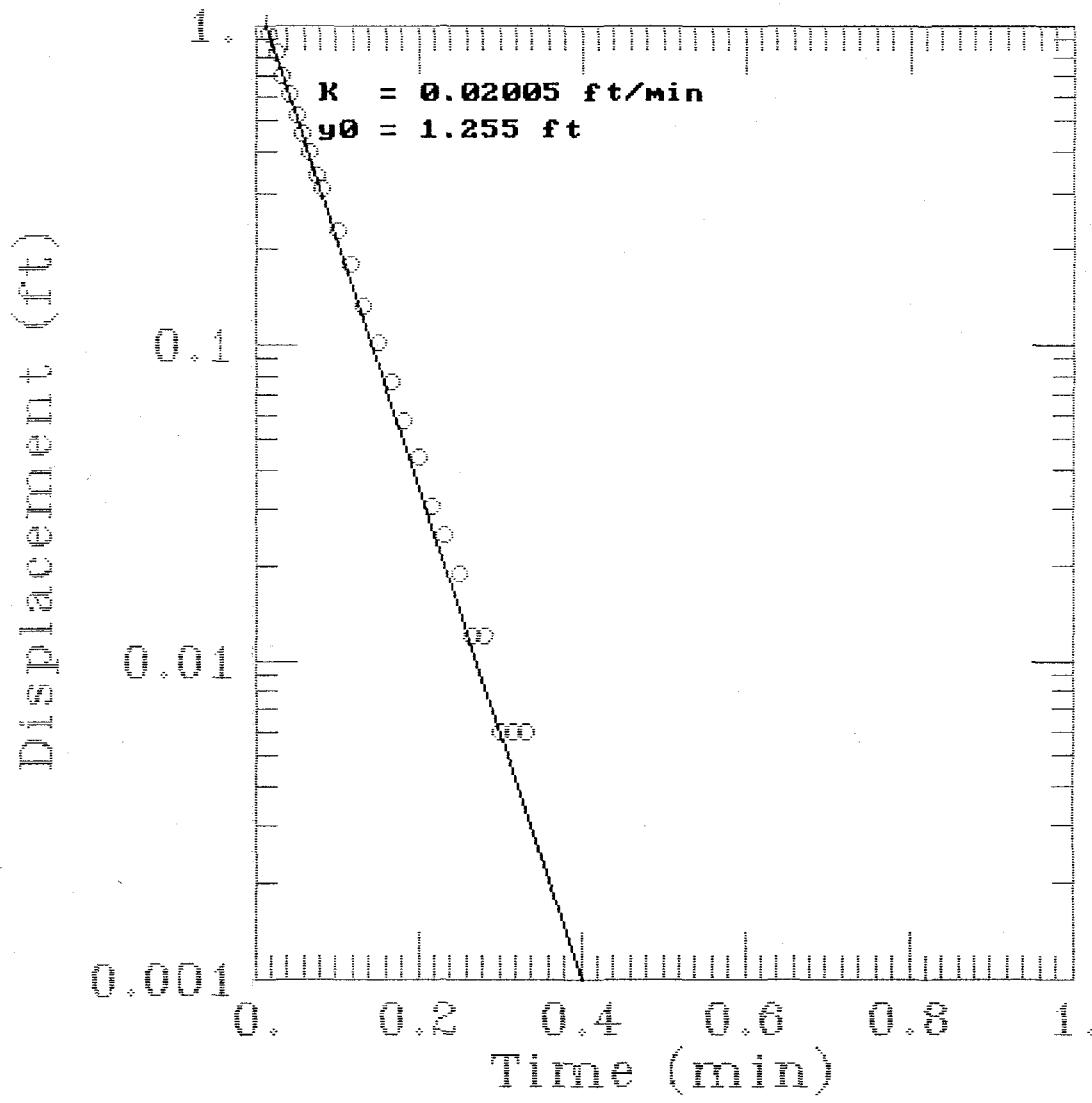
WHF-15-2I RUN #1



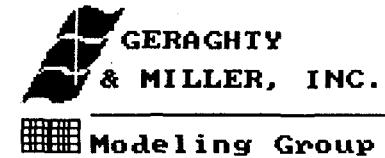
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WHF-15-2I RUN #2

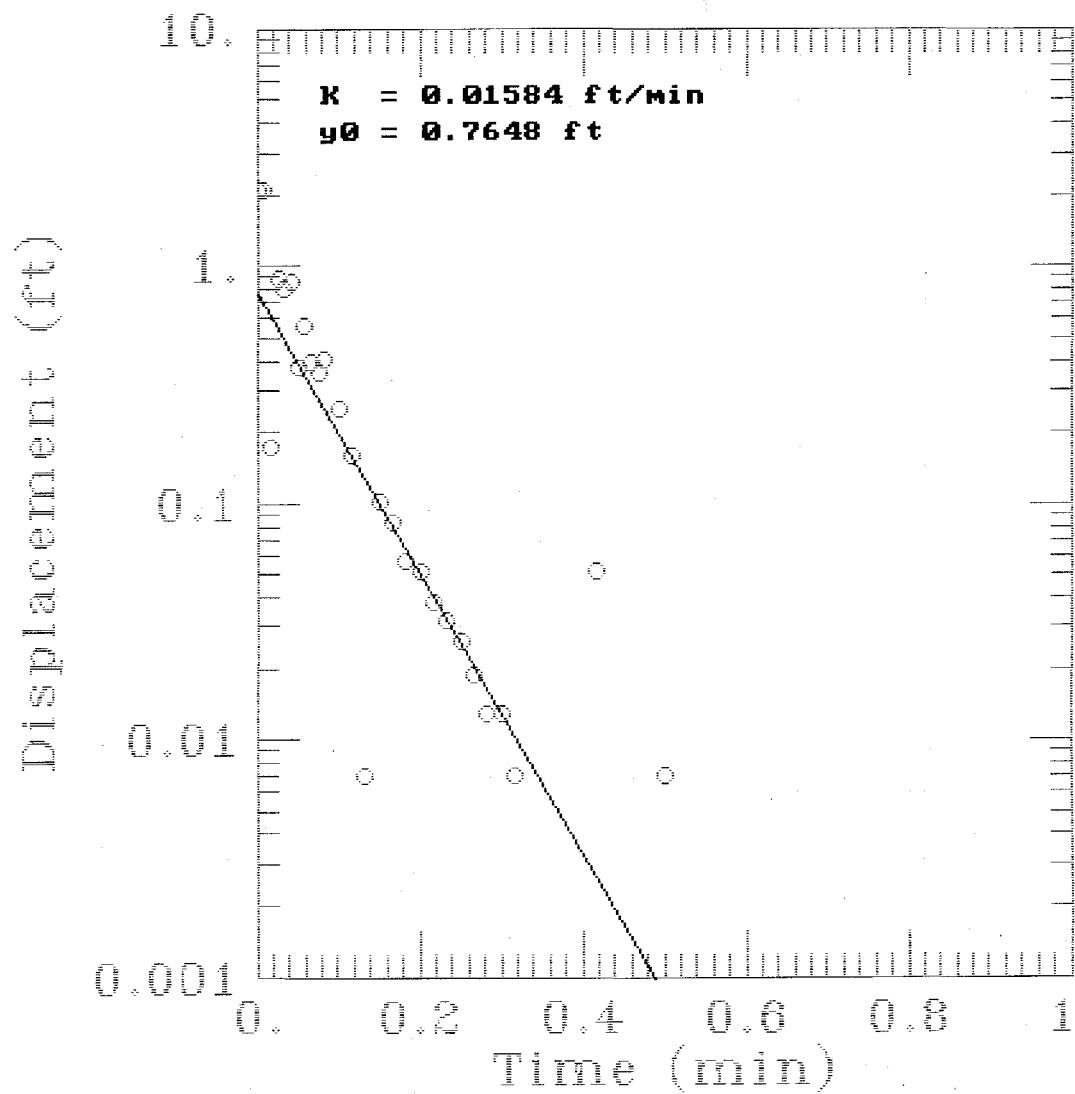


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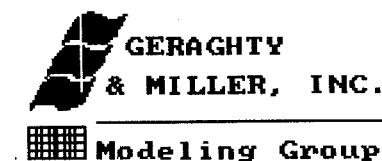


Modeling Group

WHF-15-2I RUN #3

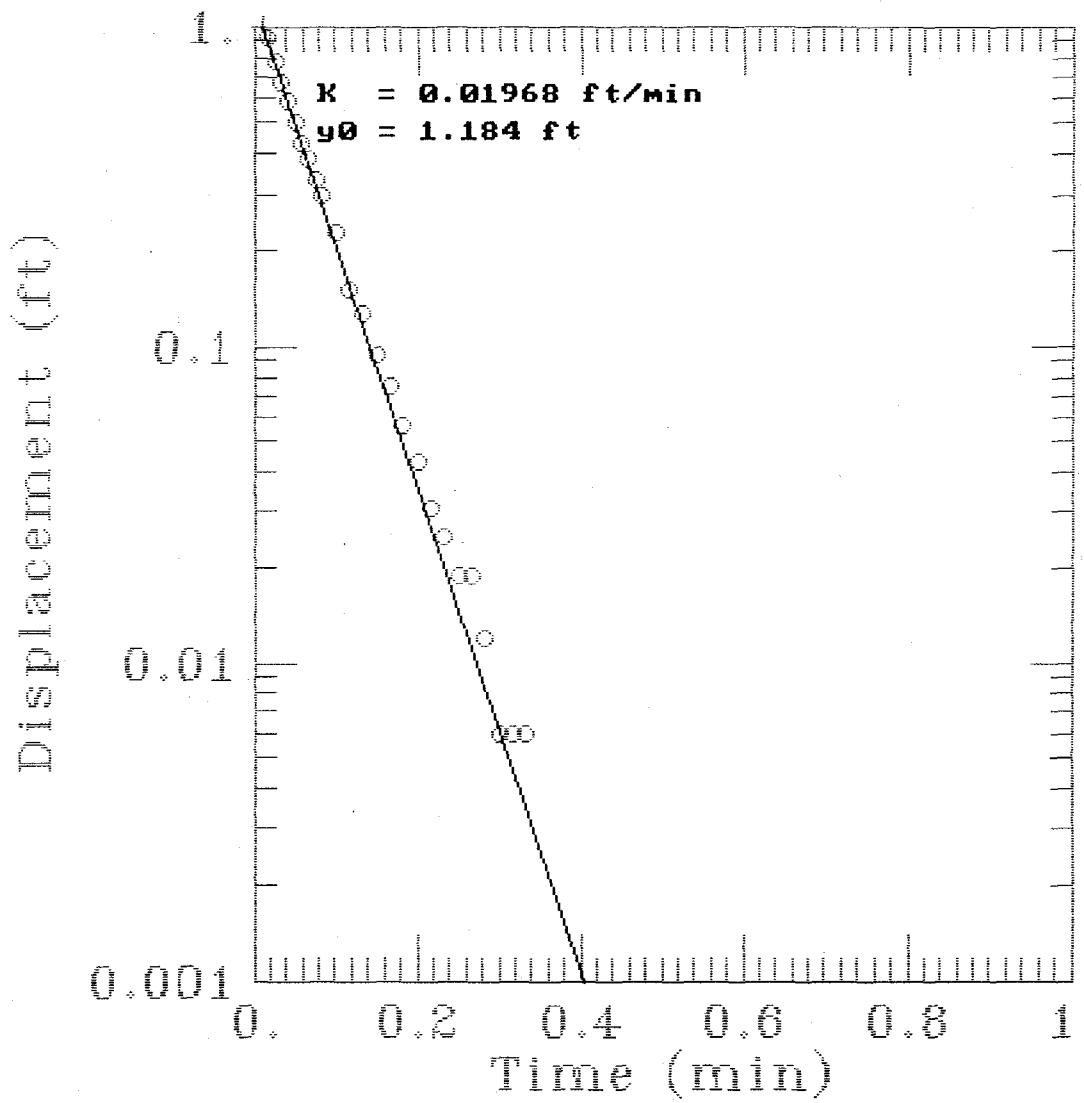


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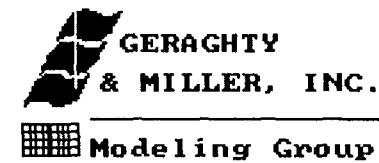


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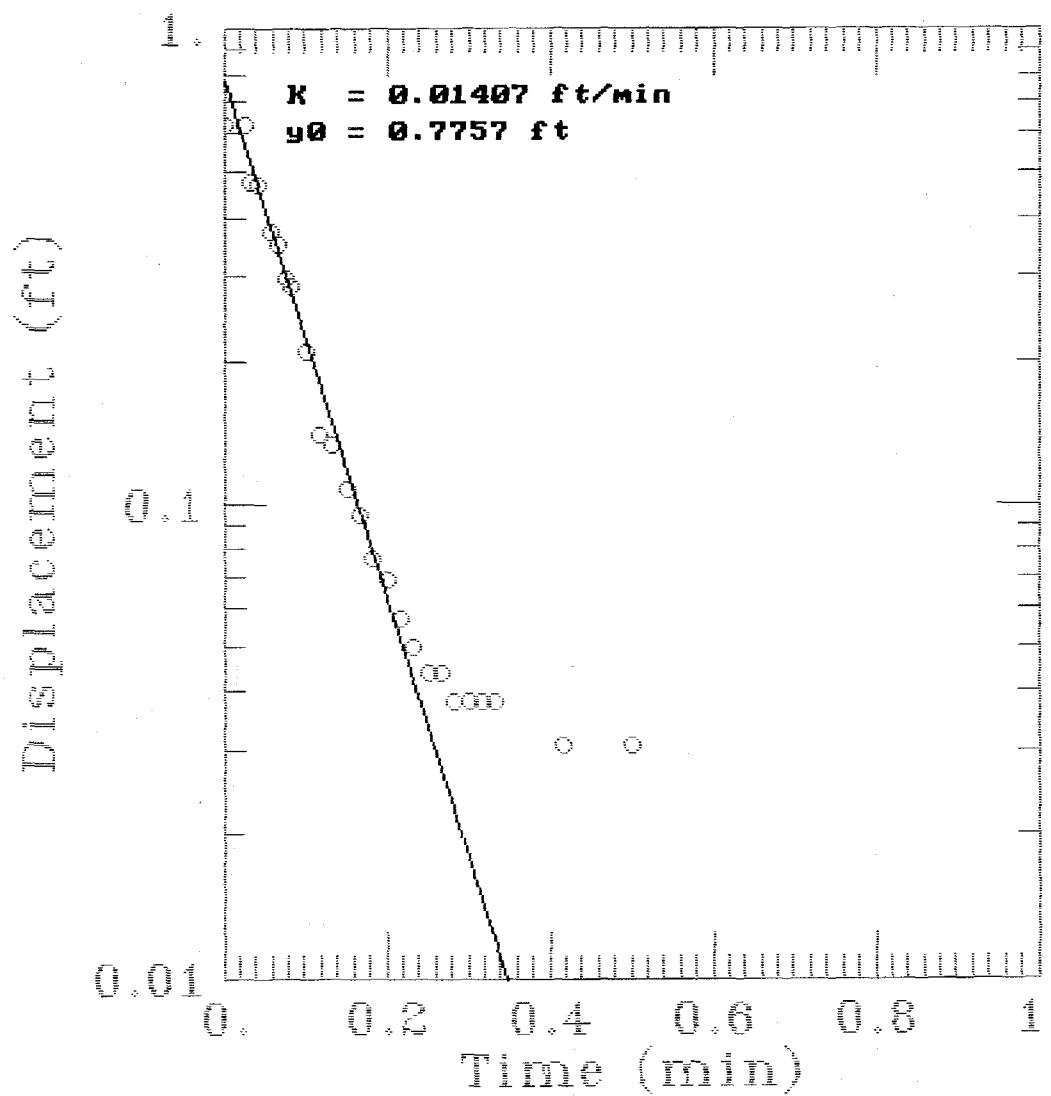
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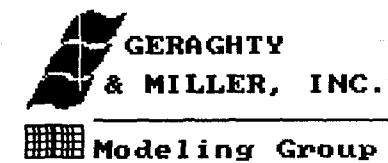
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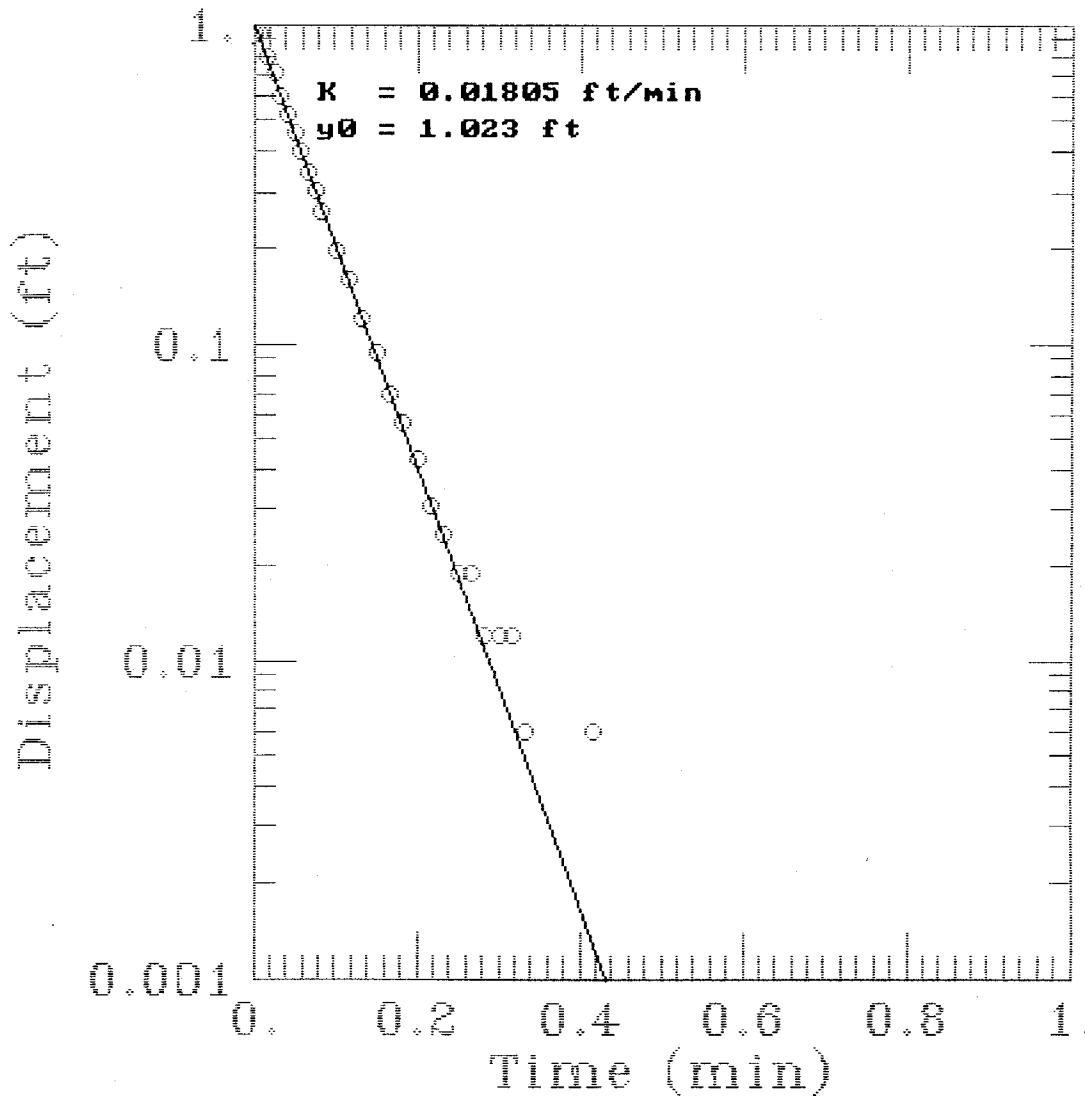
WHF-15-2I RUN #5



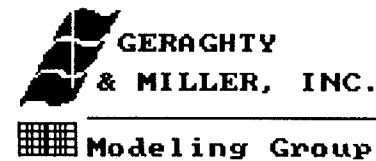
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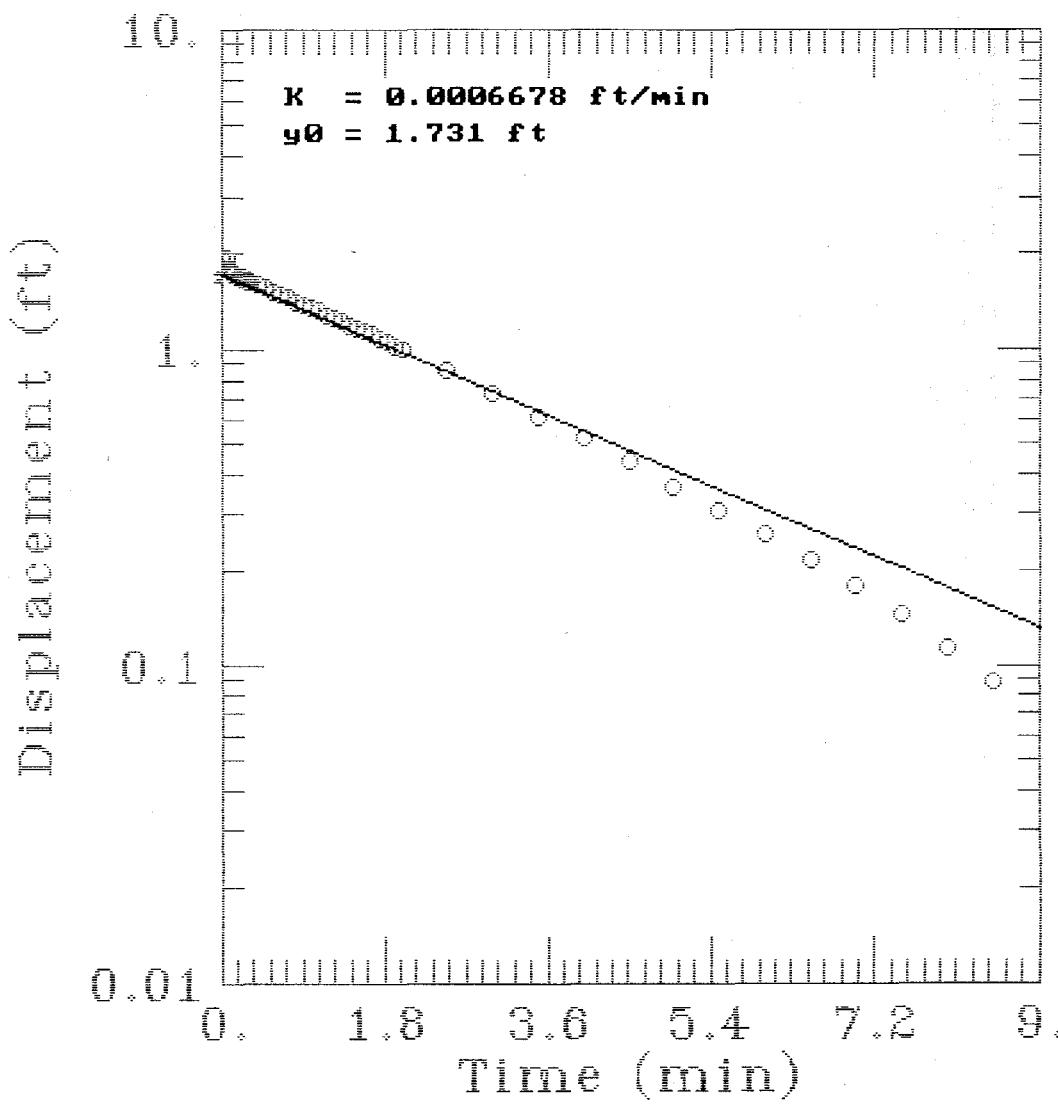
WHF-15-2I RUN #6



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WHF-15-2D RUN #1

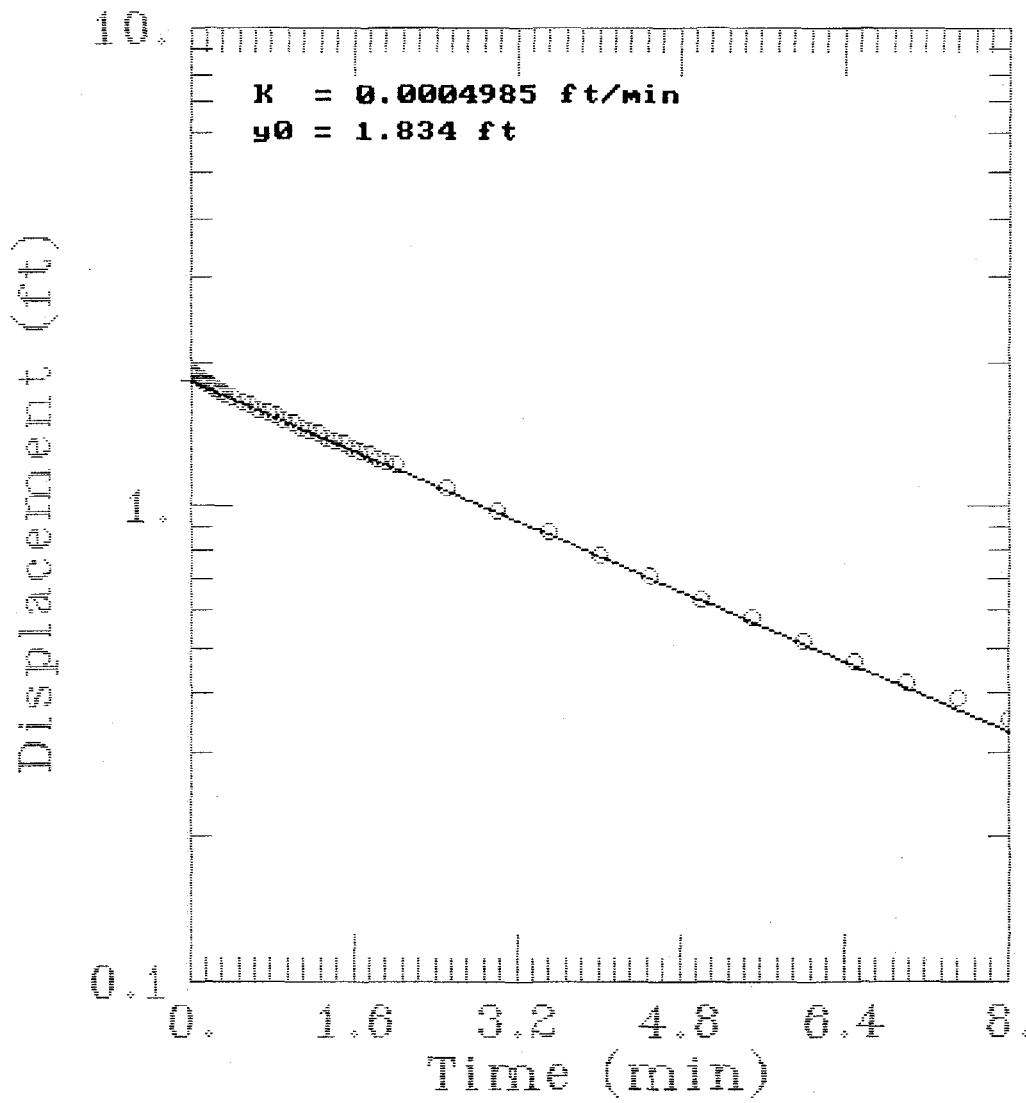


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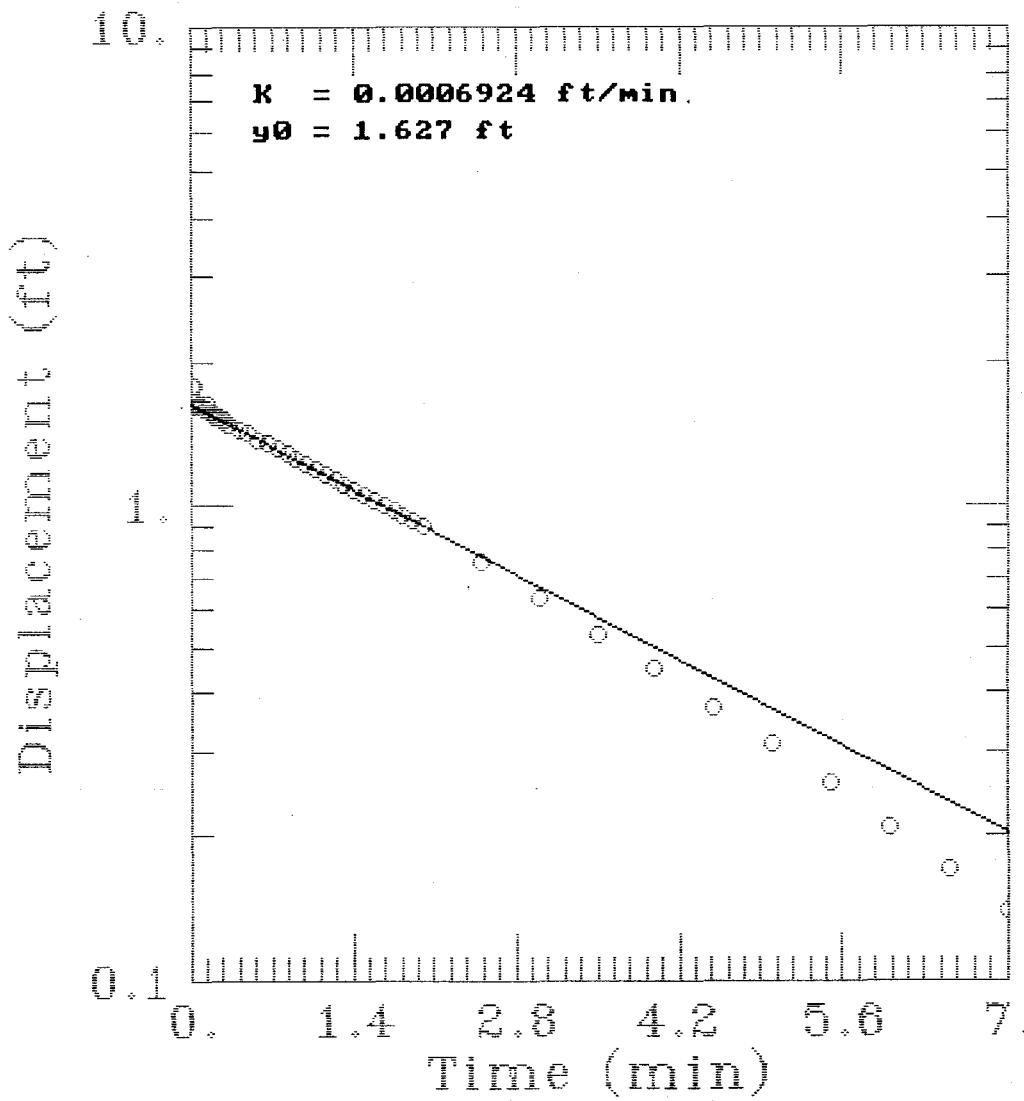
Modeling Group

WHF-15-2D RUN #2

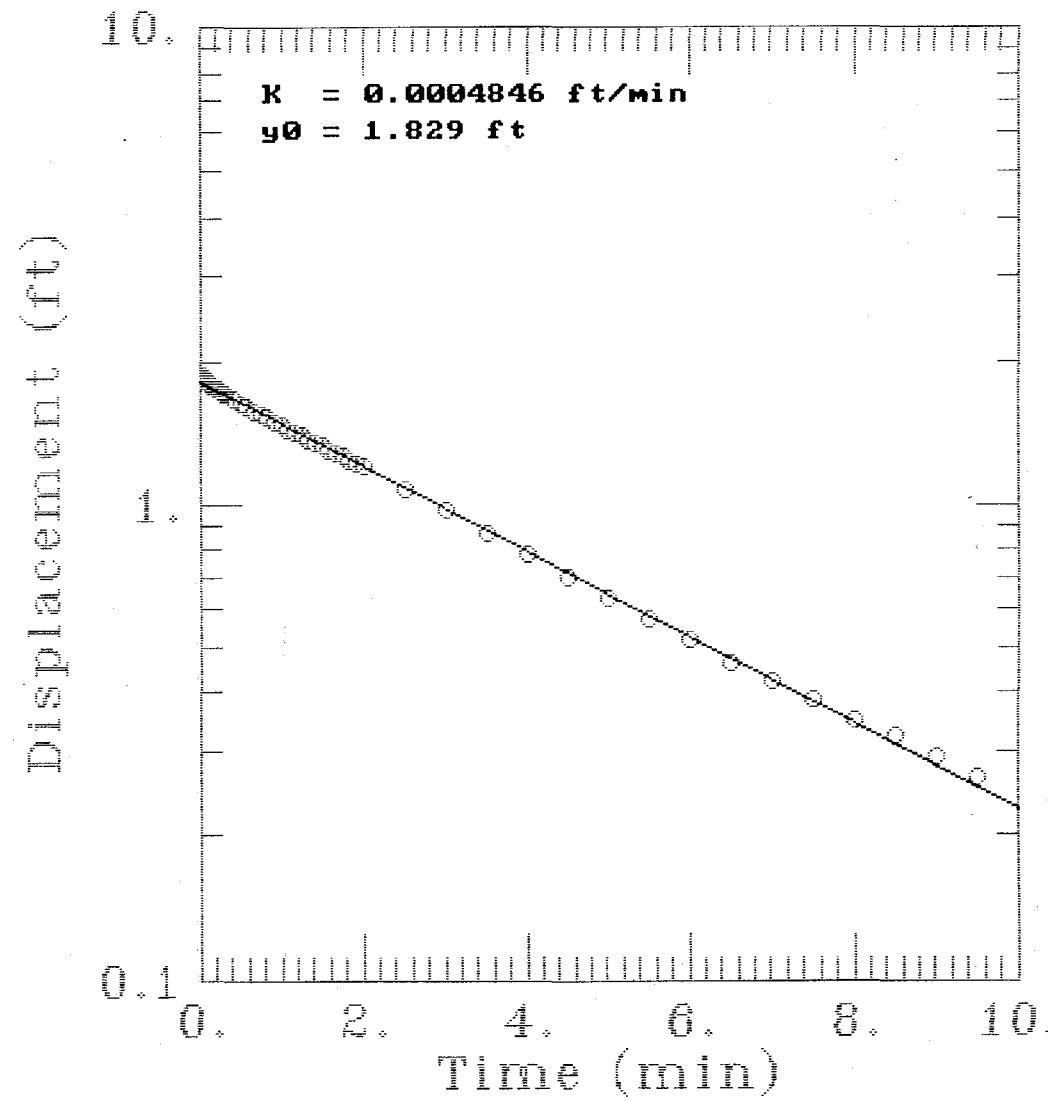


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WHF-15-2D RUN #3

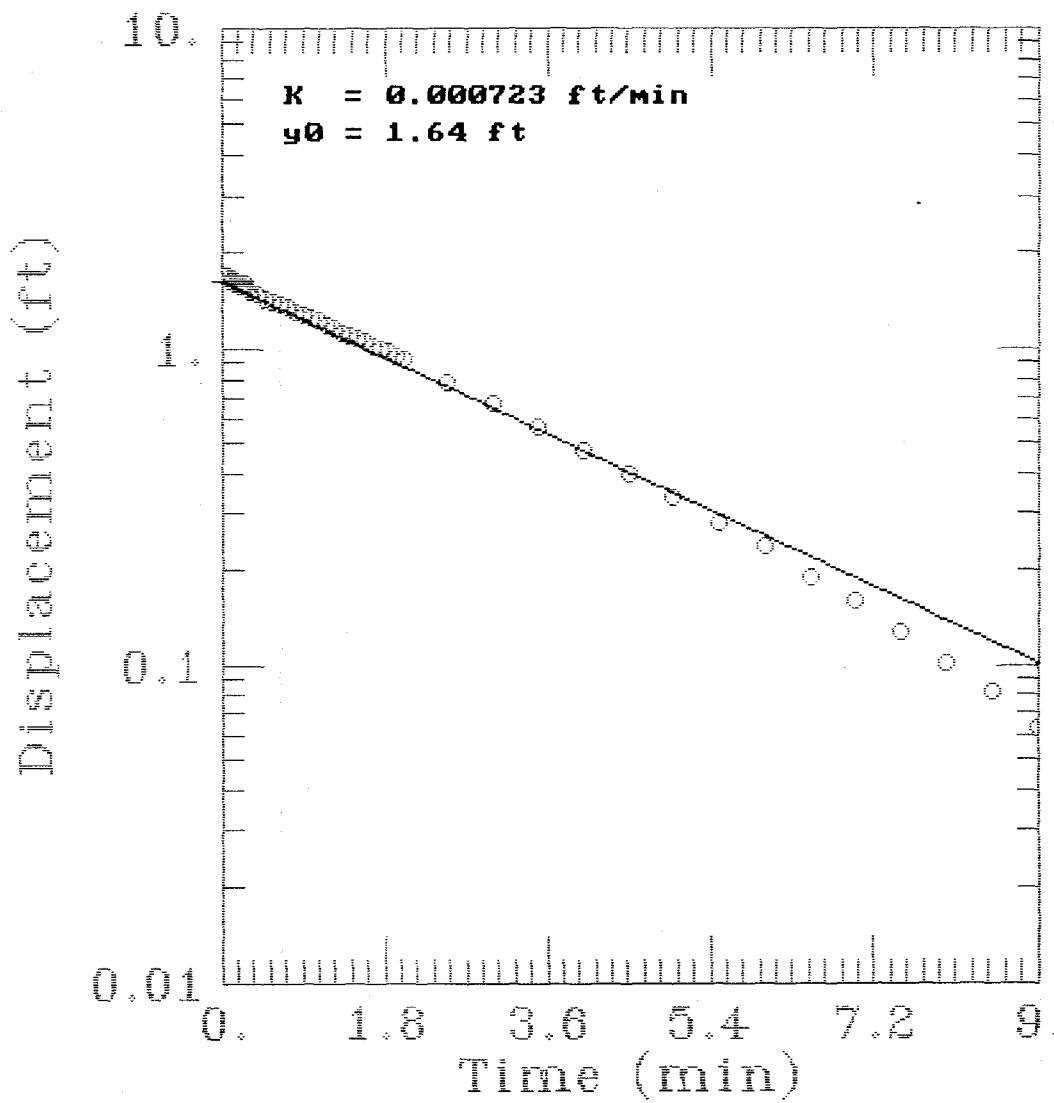


WHF-15-2D RUN #4

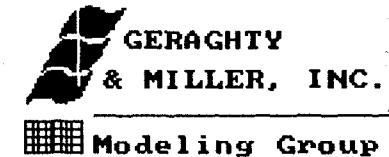


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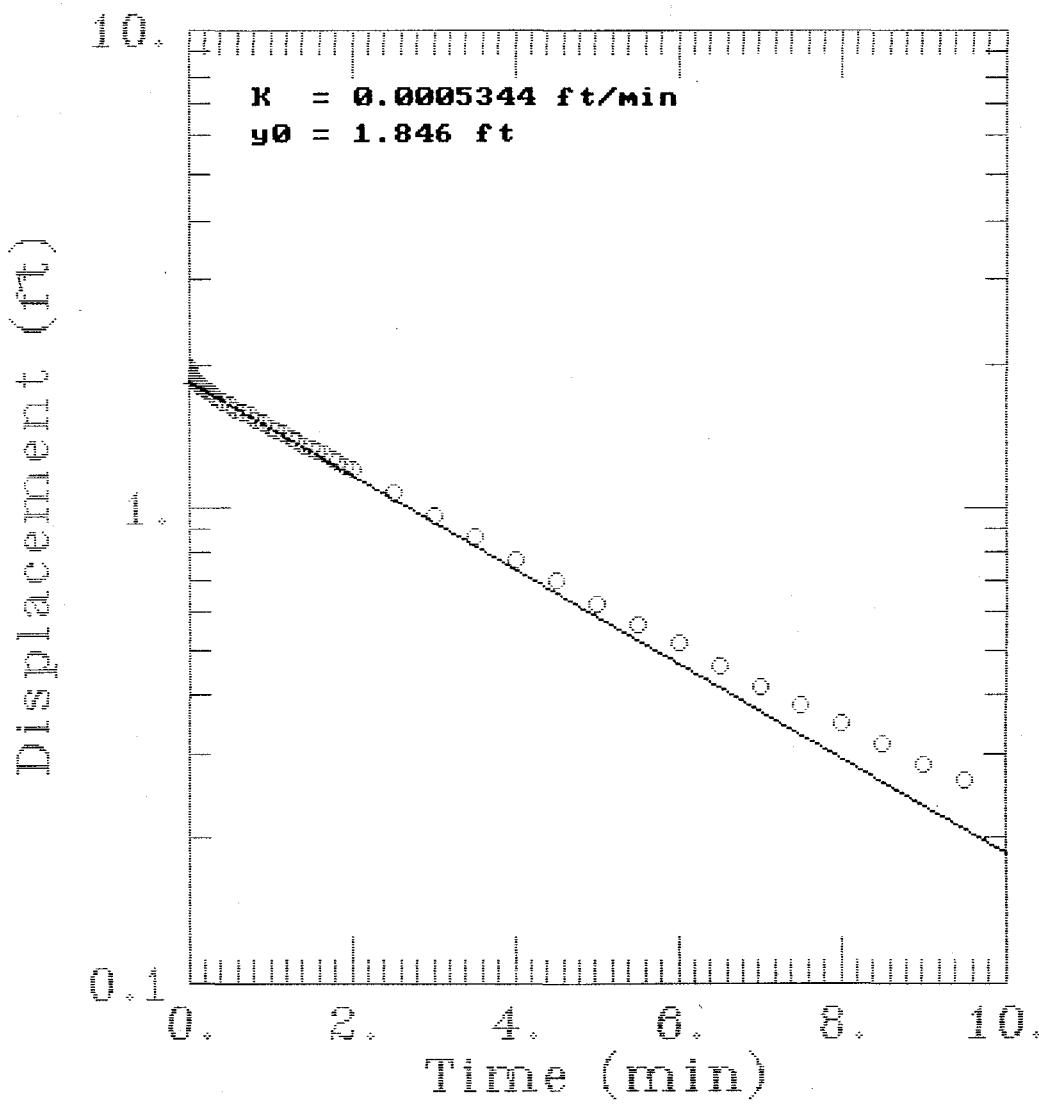
WHF-15-2D RUN #5



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WHF-15-2D RUN #6



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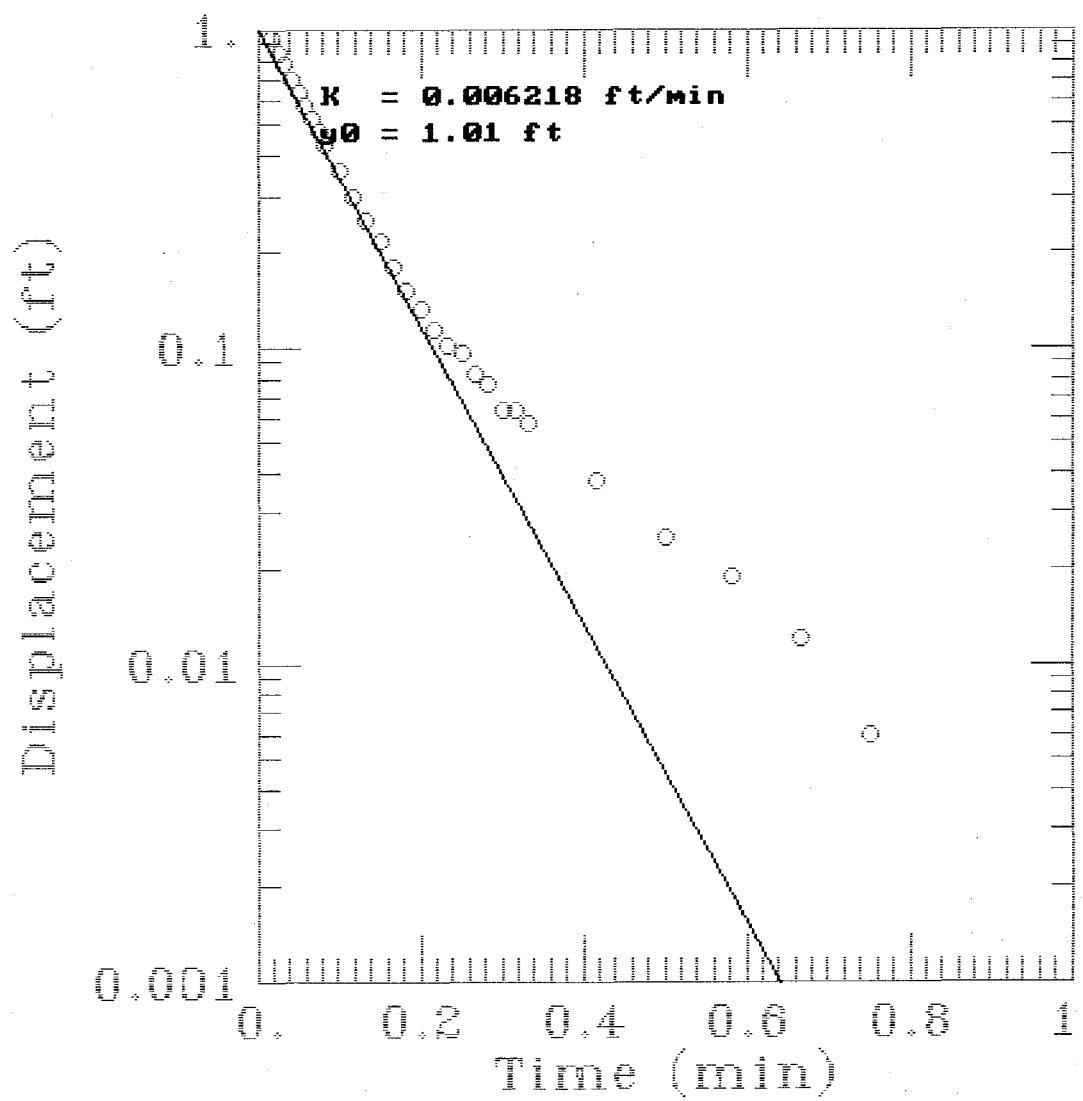


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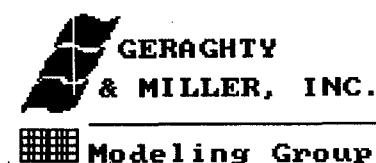
Modeling Group

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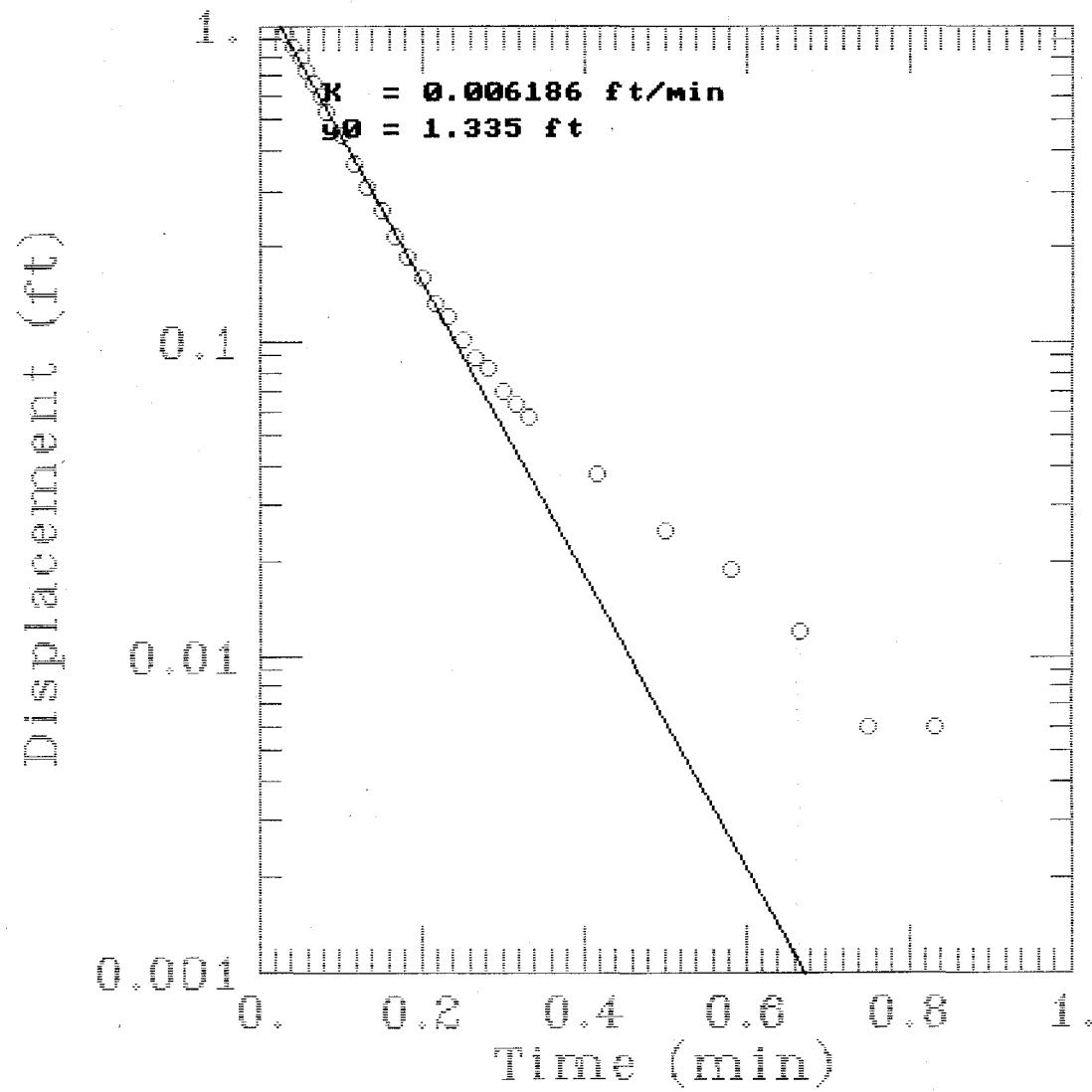
WHF-15-3S RUN #1



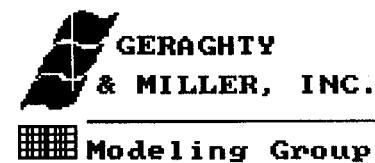
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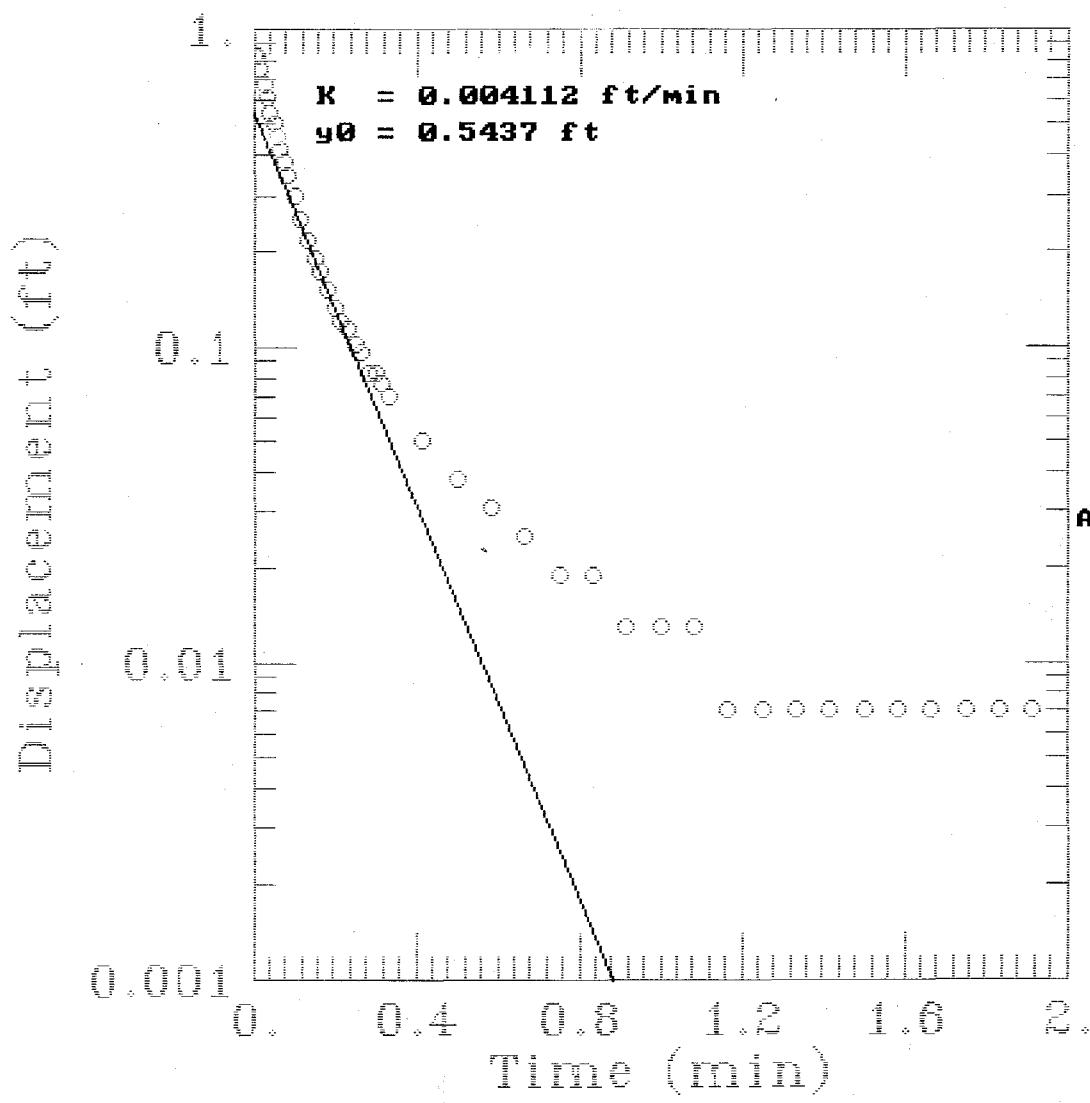
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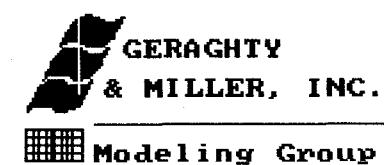
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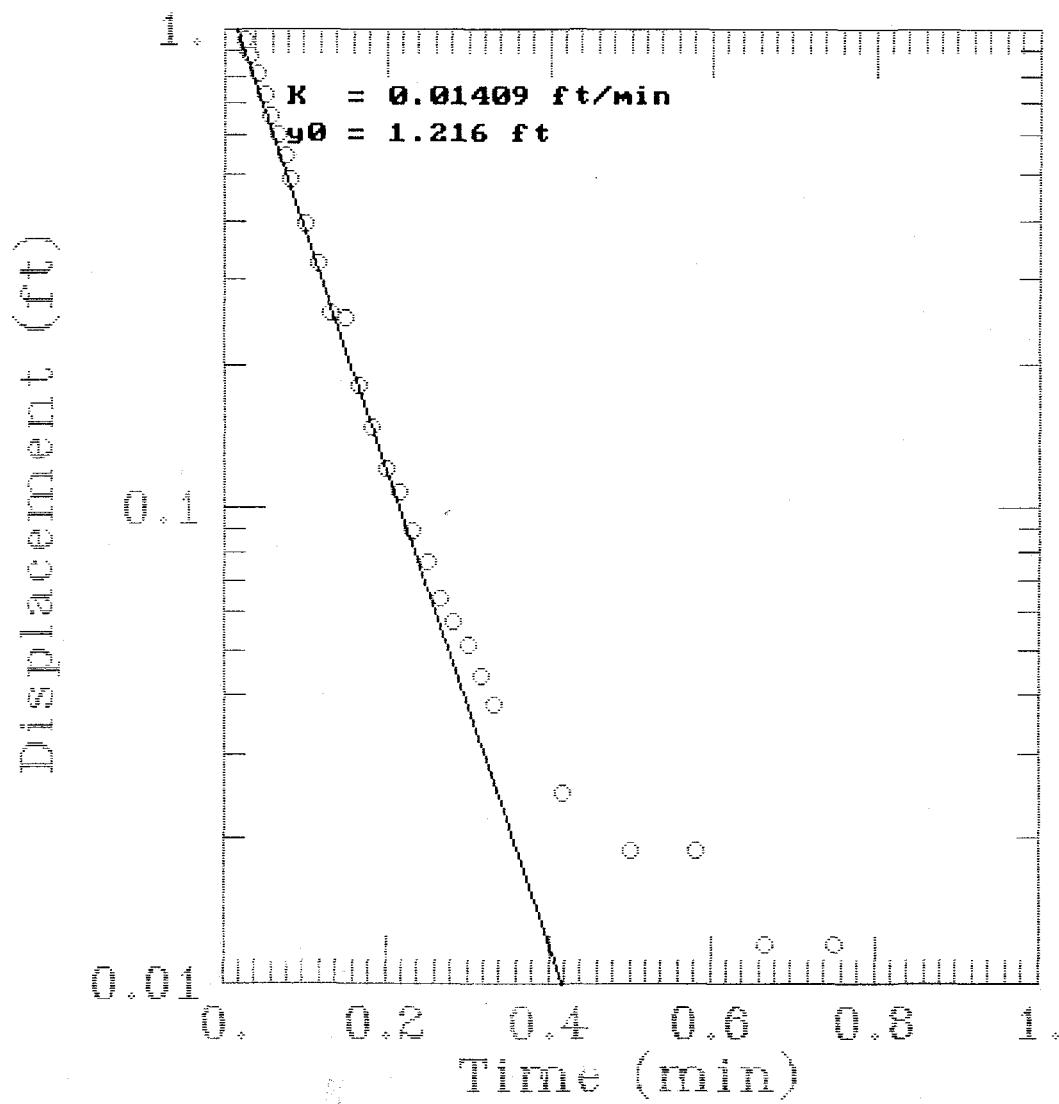
WHF-15-3S RUN #3



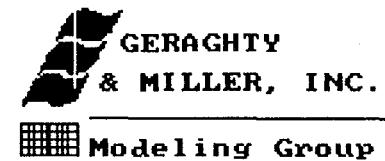
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WHF-15-3I RUN #1



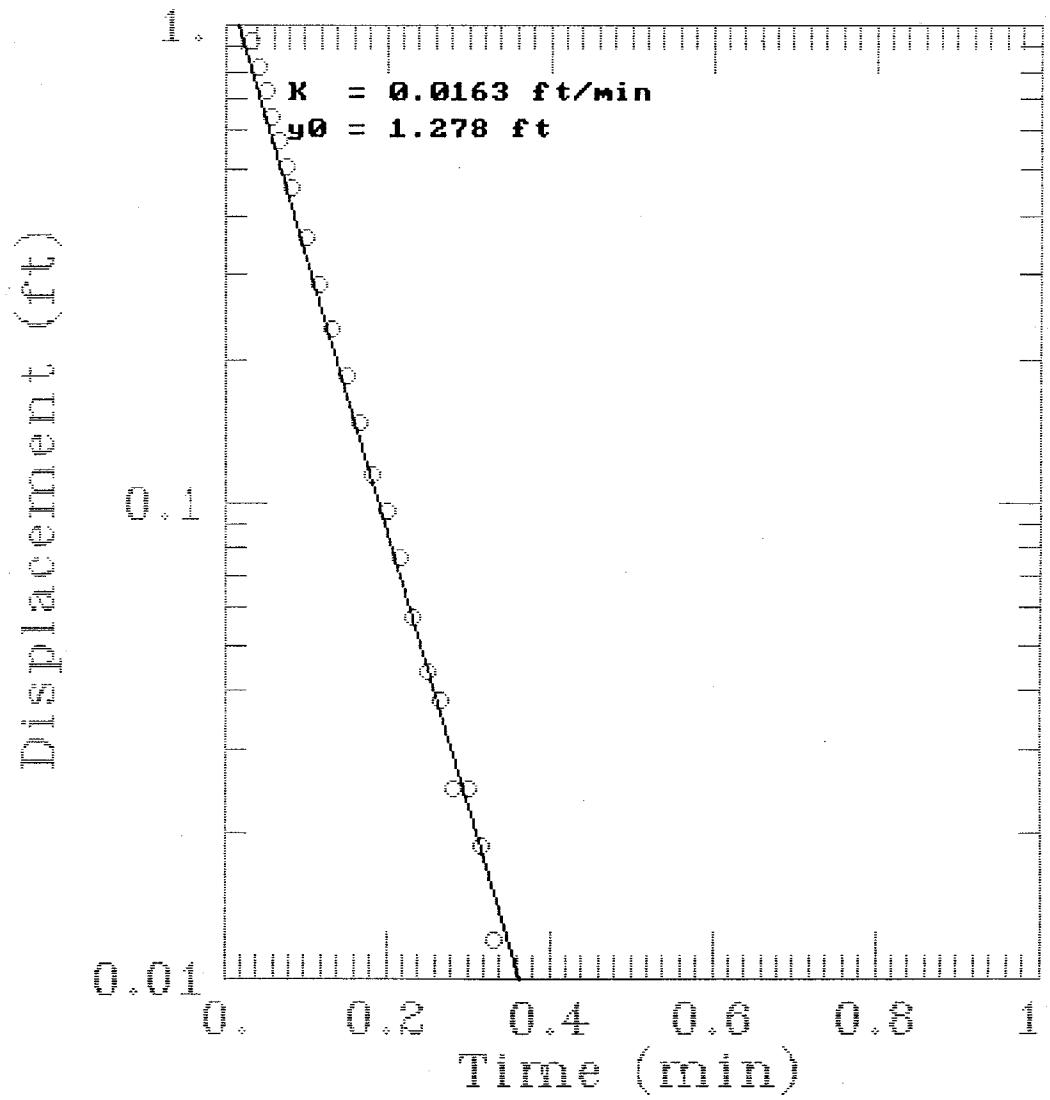
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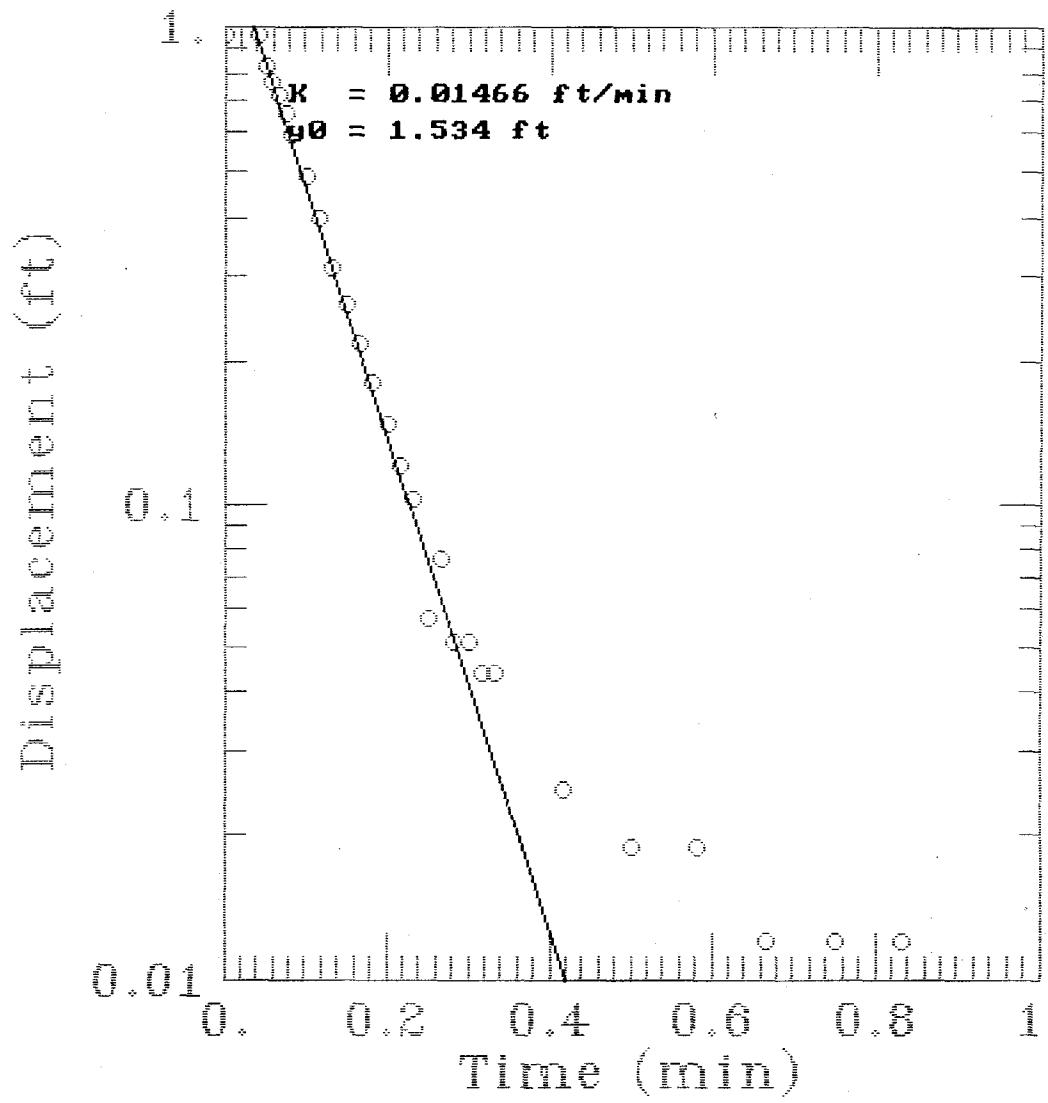
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WHF-15-3I RUN #2



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WHF-15-3I RUN #3

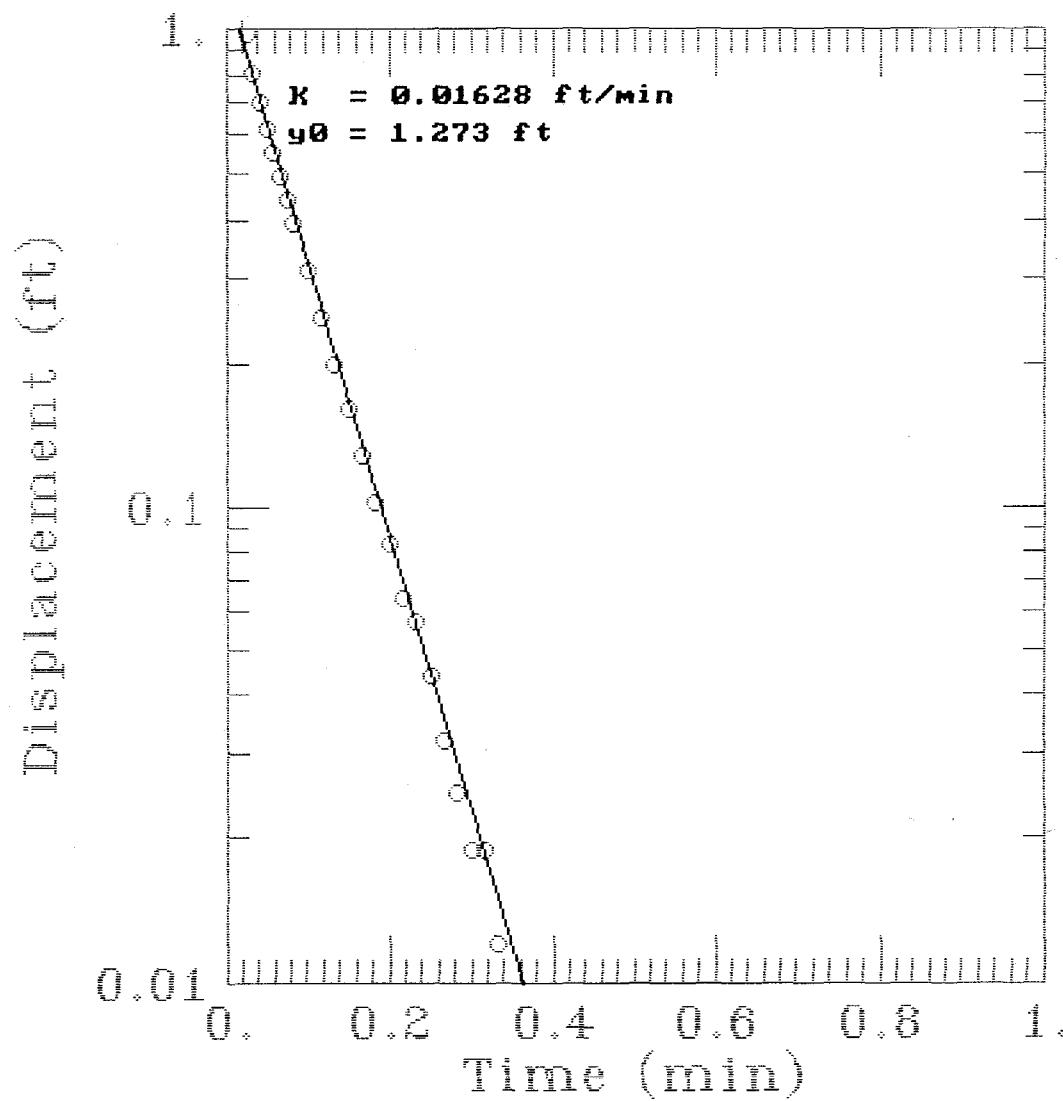


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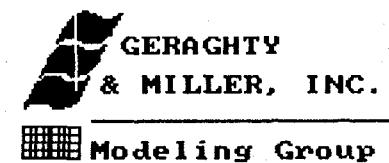


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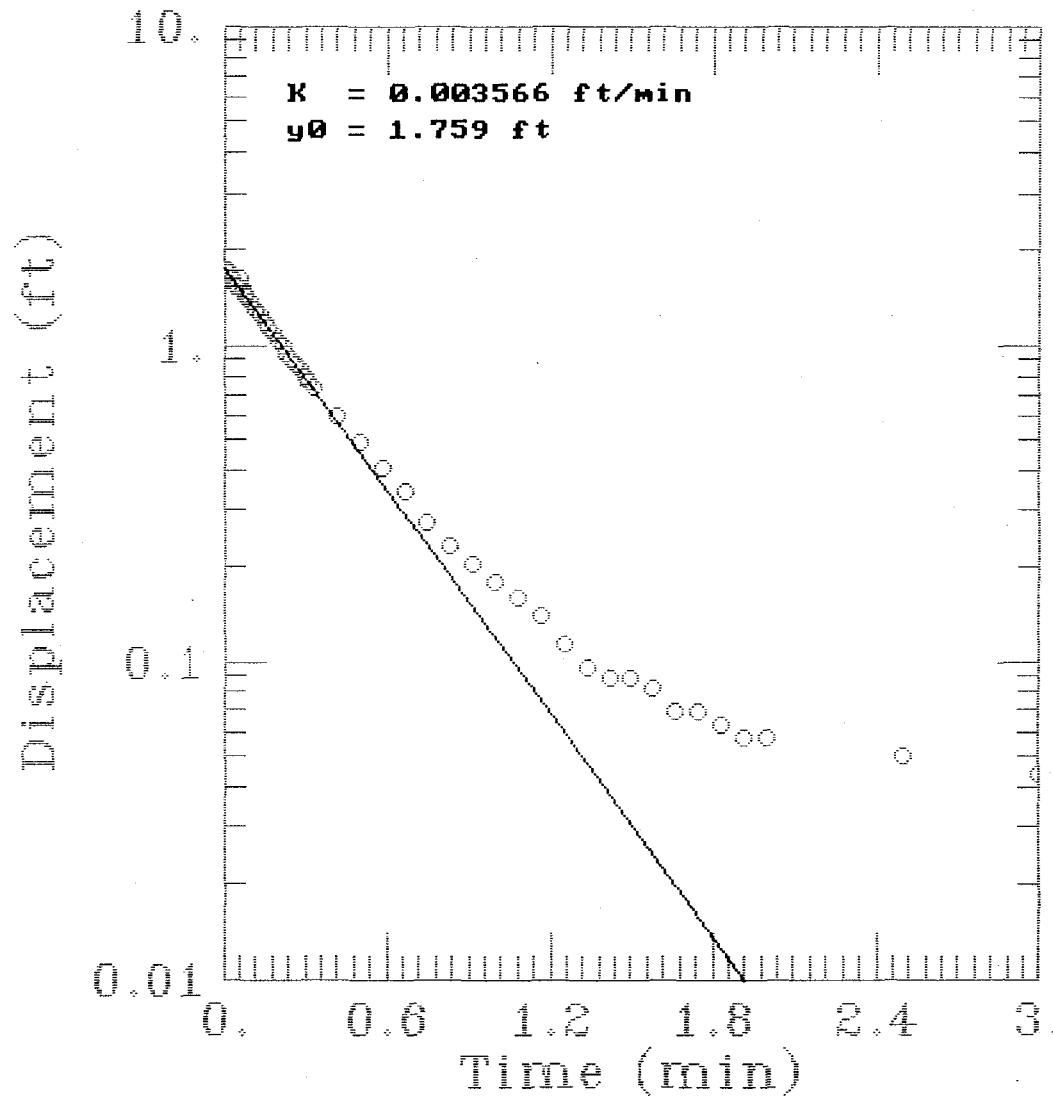
WHF-15-3I RUN #4



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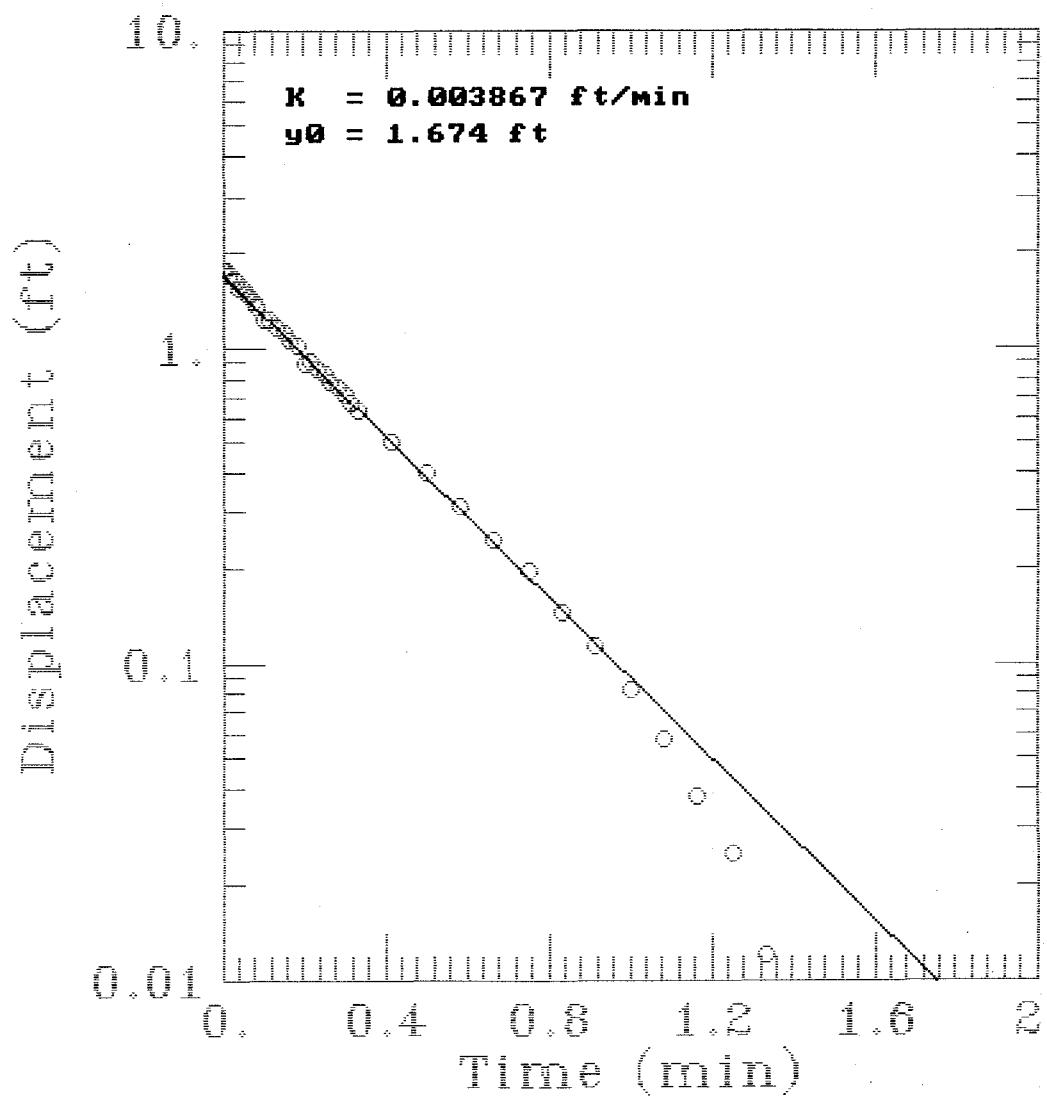


WHF-15-3D RUN #1

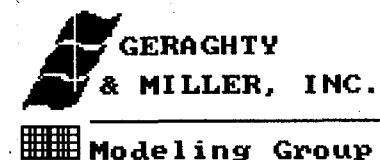


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WHF-15-3D RUN #2



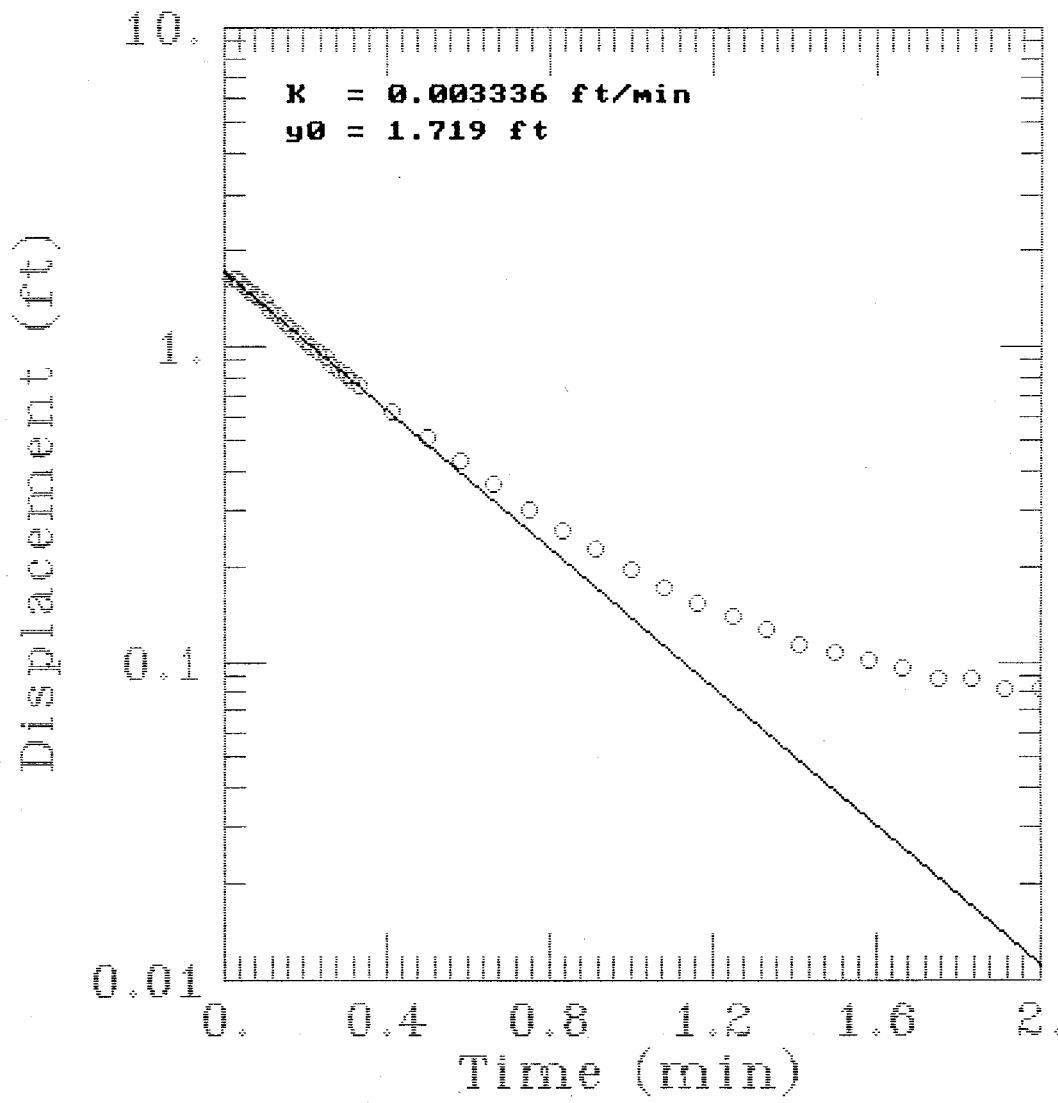
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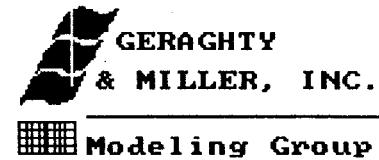
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& MILLER, INC.

Modeling Group

WHF-15-3D RUN #3



AQTESOLV

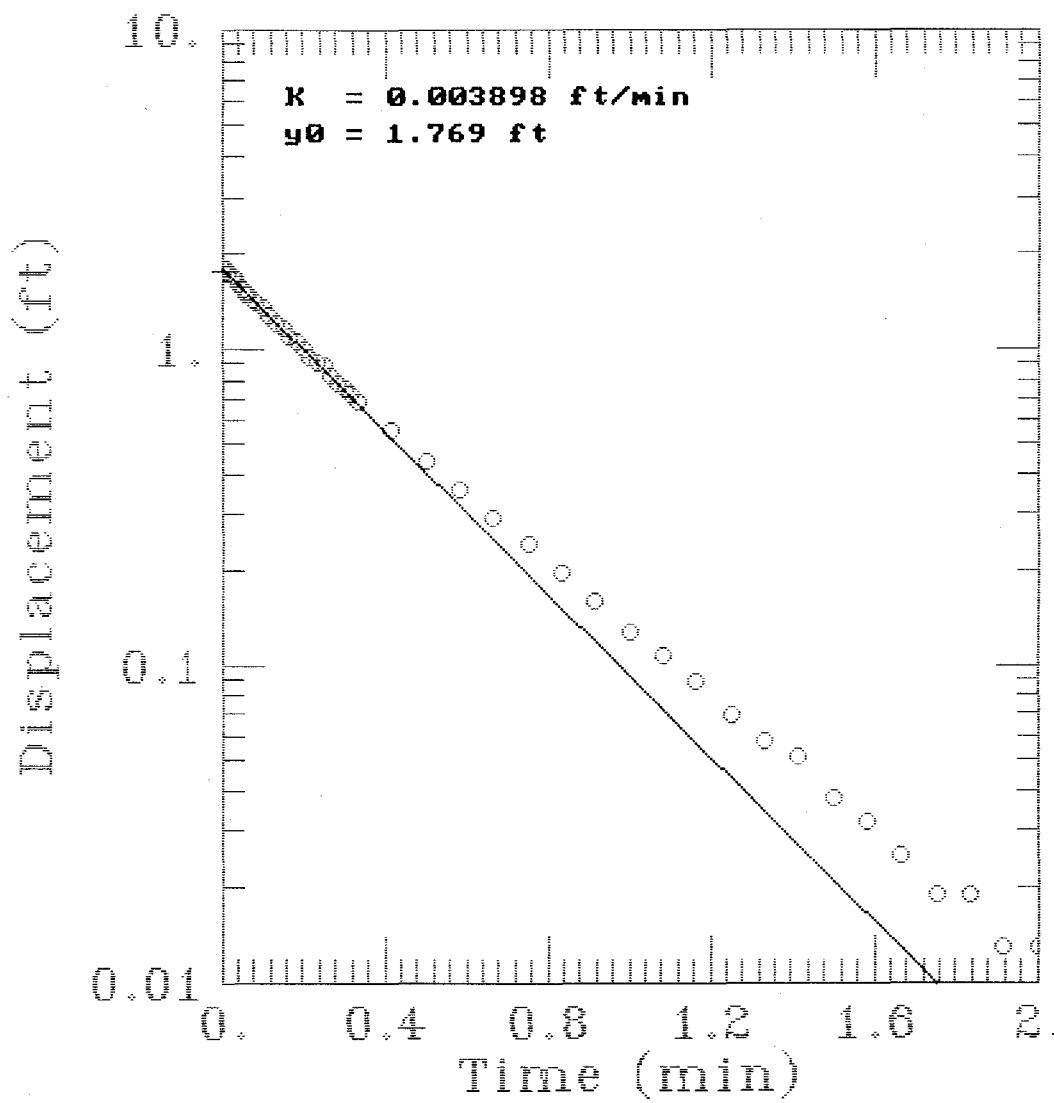


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& MILLER, INC.

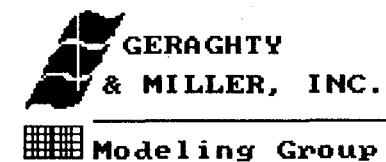


Modeling Group

WHF-15-3D RUN #4

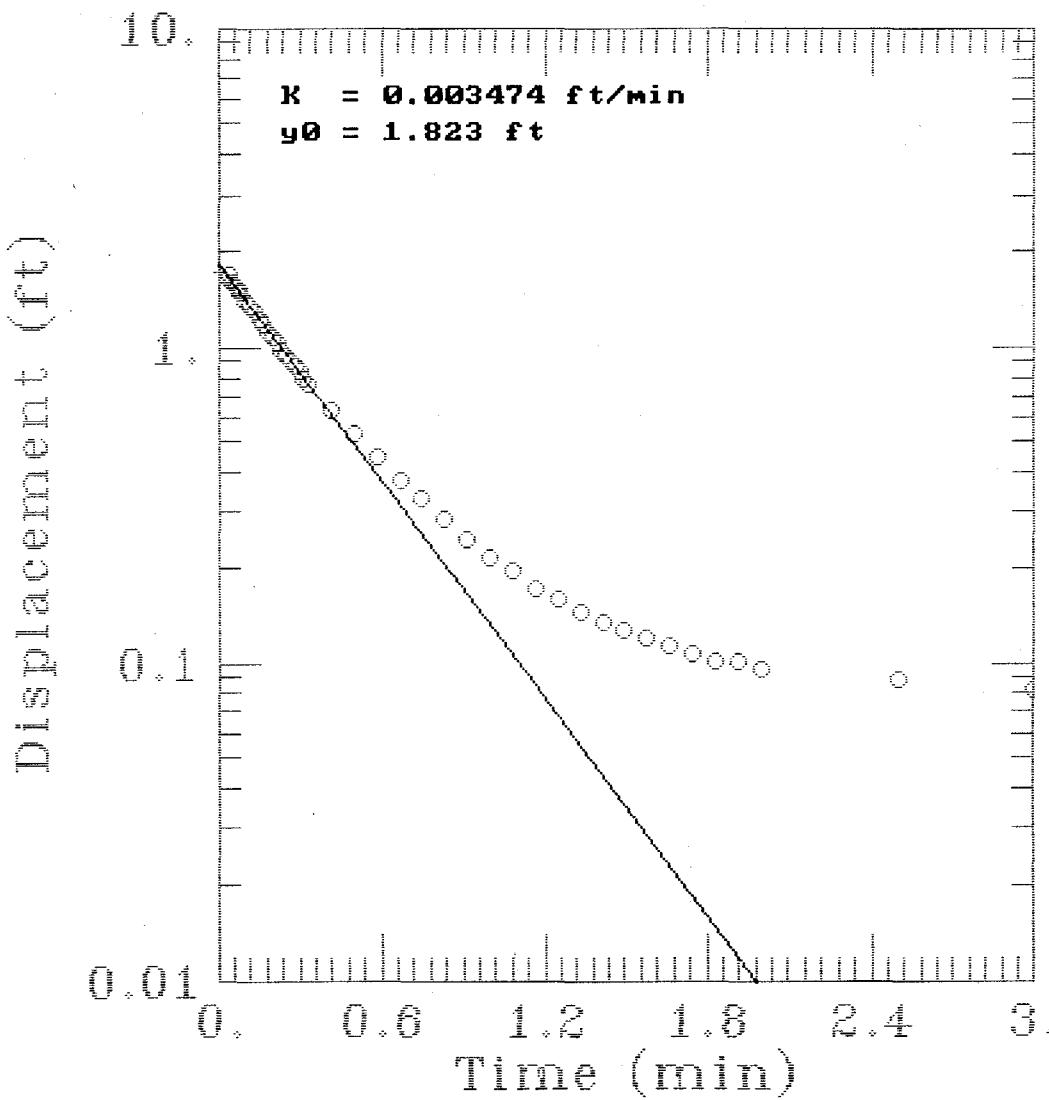


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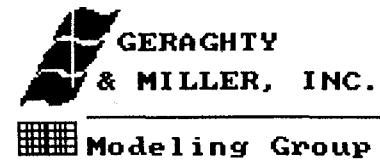


Modeling Group

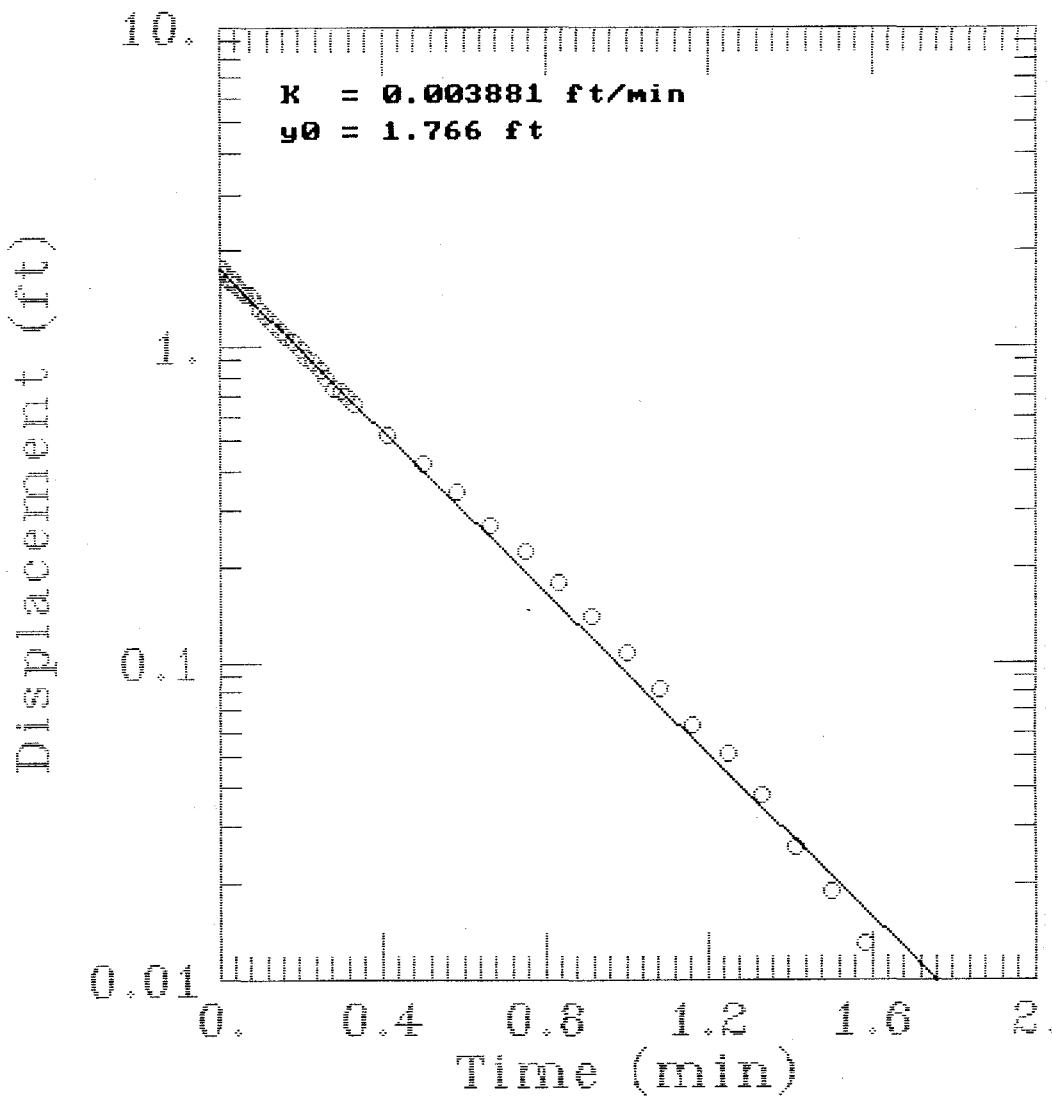
WHF-15-3D RUN #5



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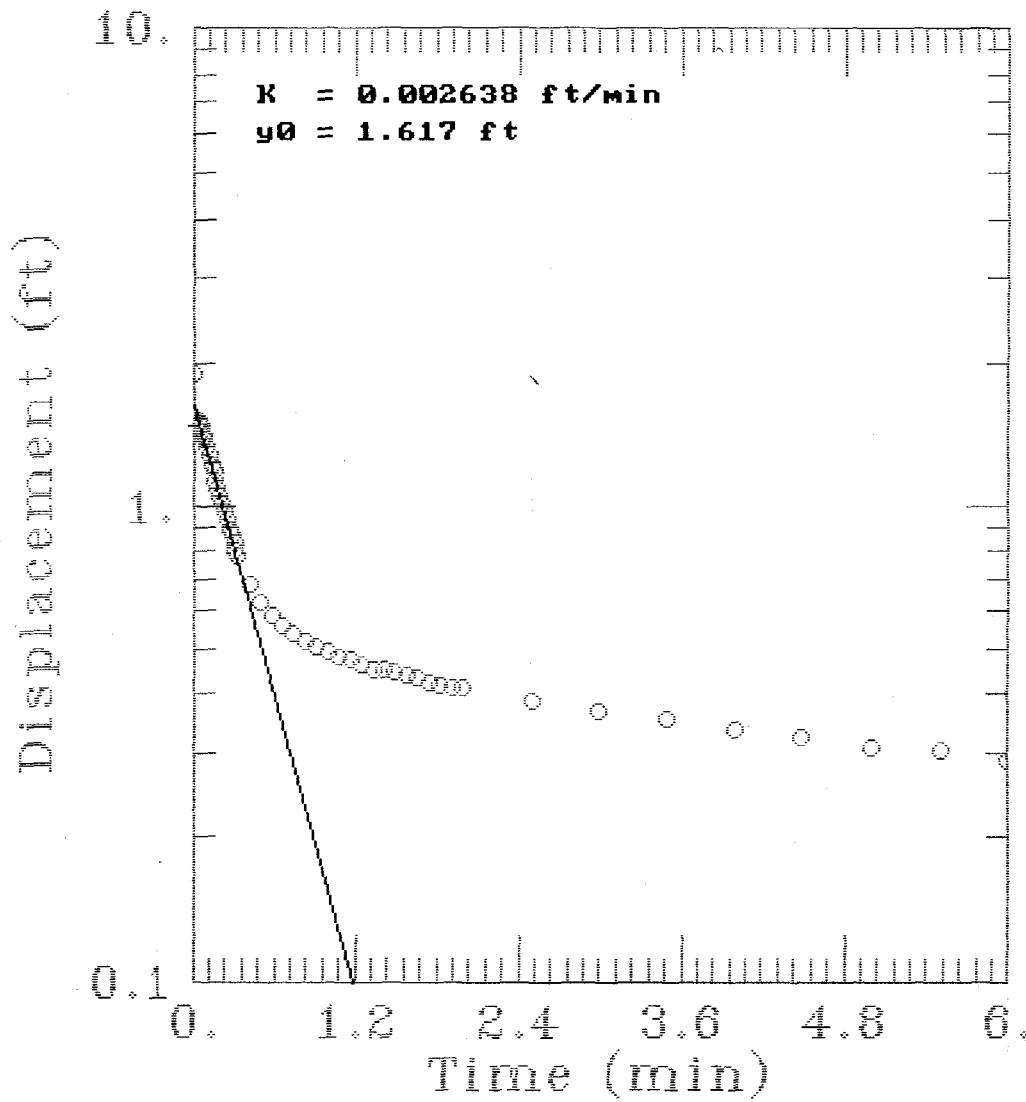


WHF-15-3D RUN #6

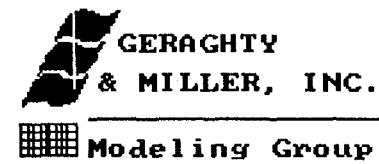


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WHF-15-6S RUN #1



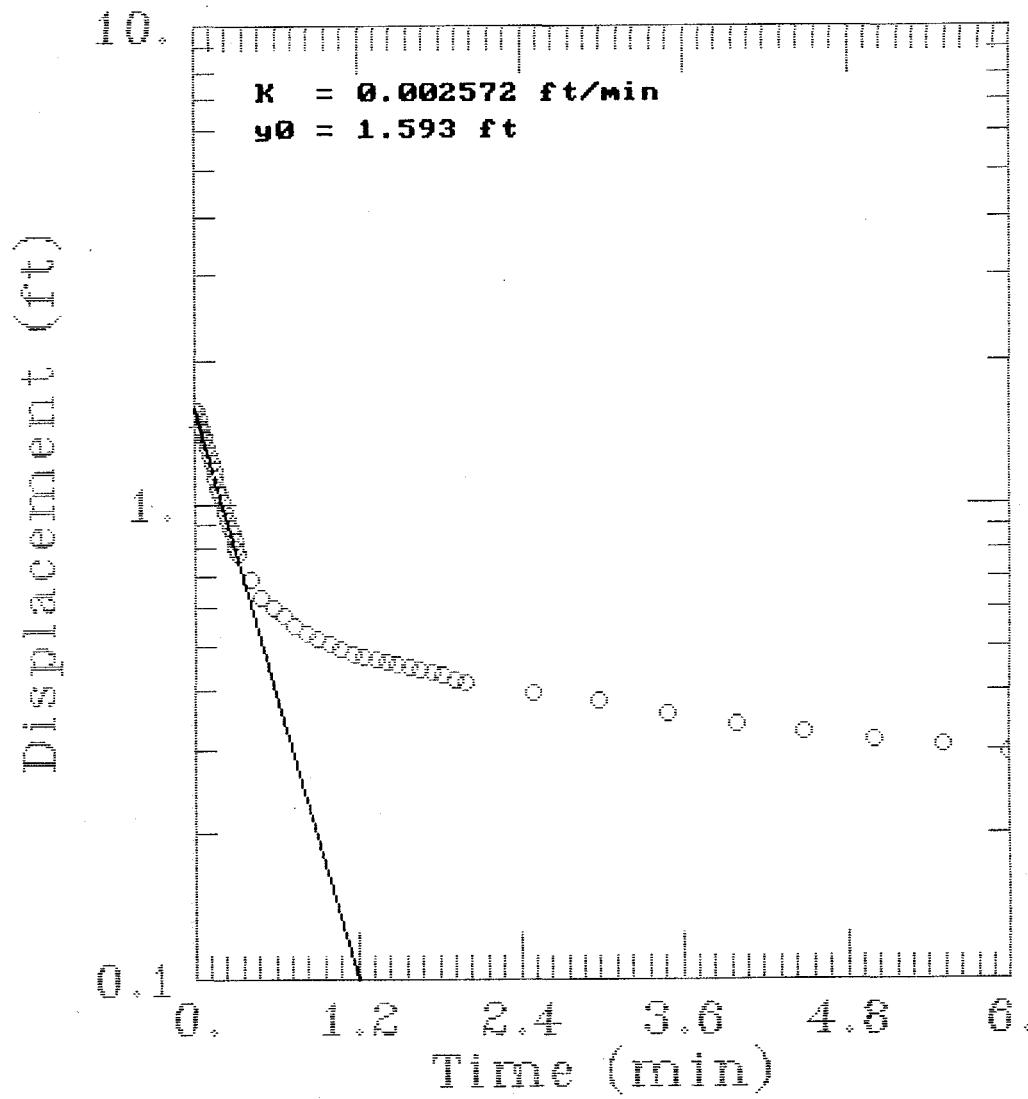
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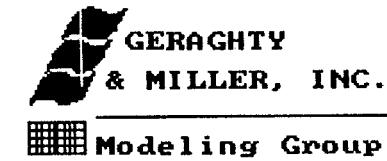
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WHF-15-6S RUN #2



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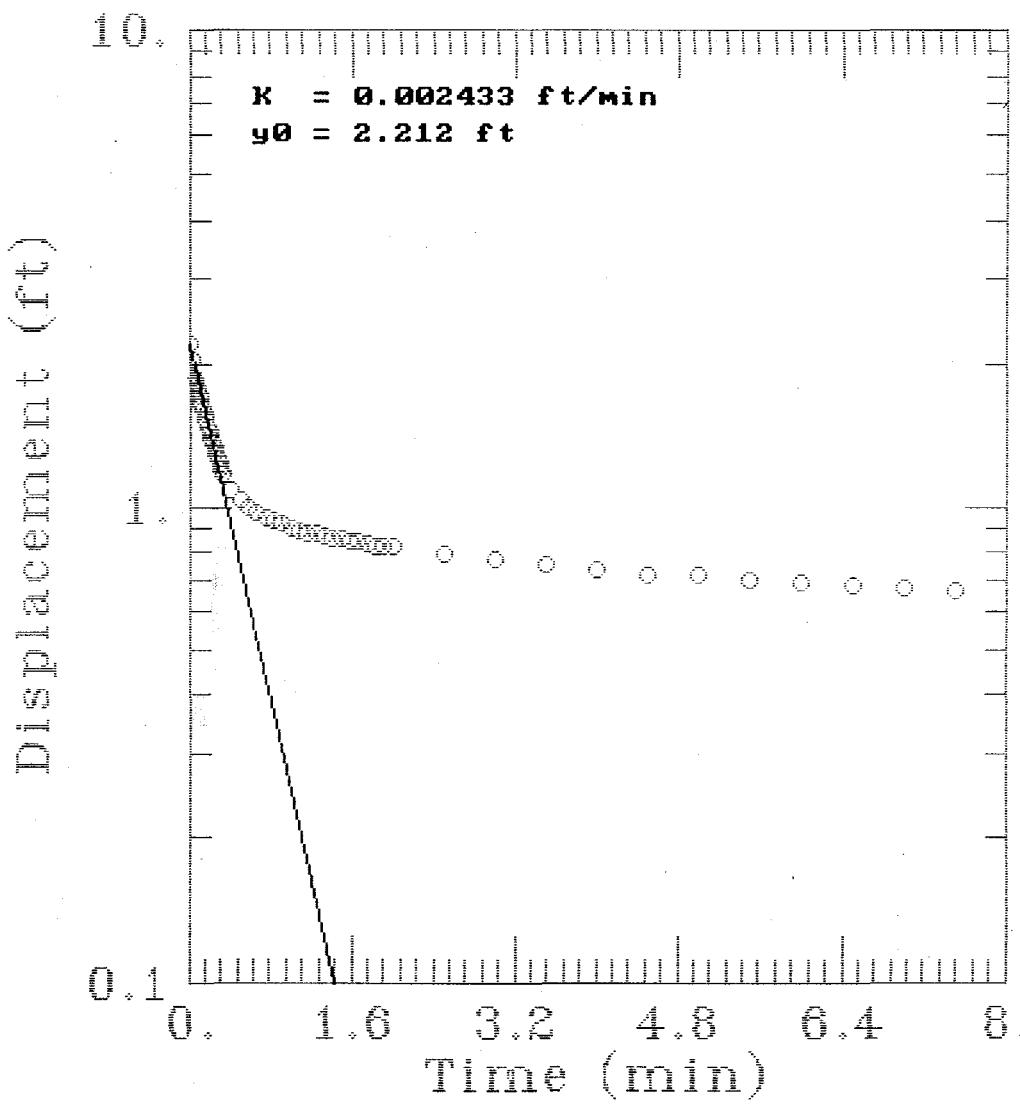


GERAGHTY
& MILLER, INC.

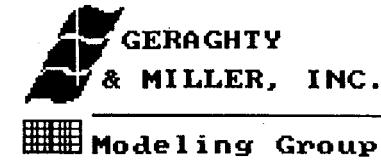


Modeling Group

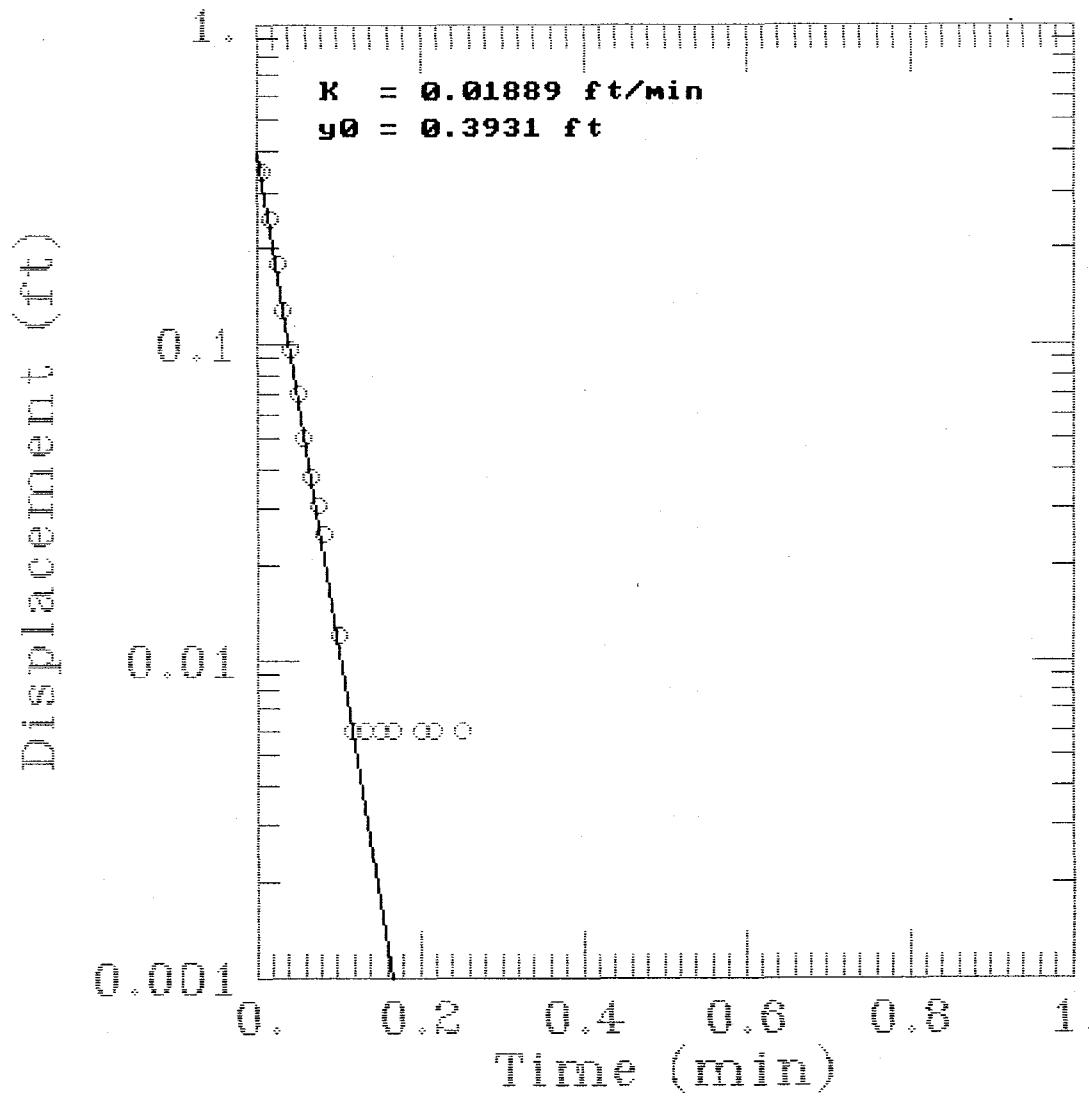
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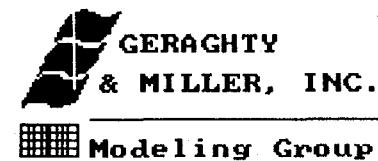
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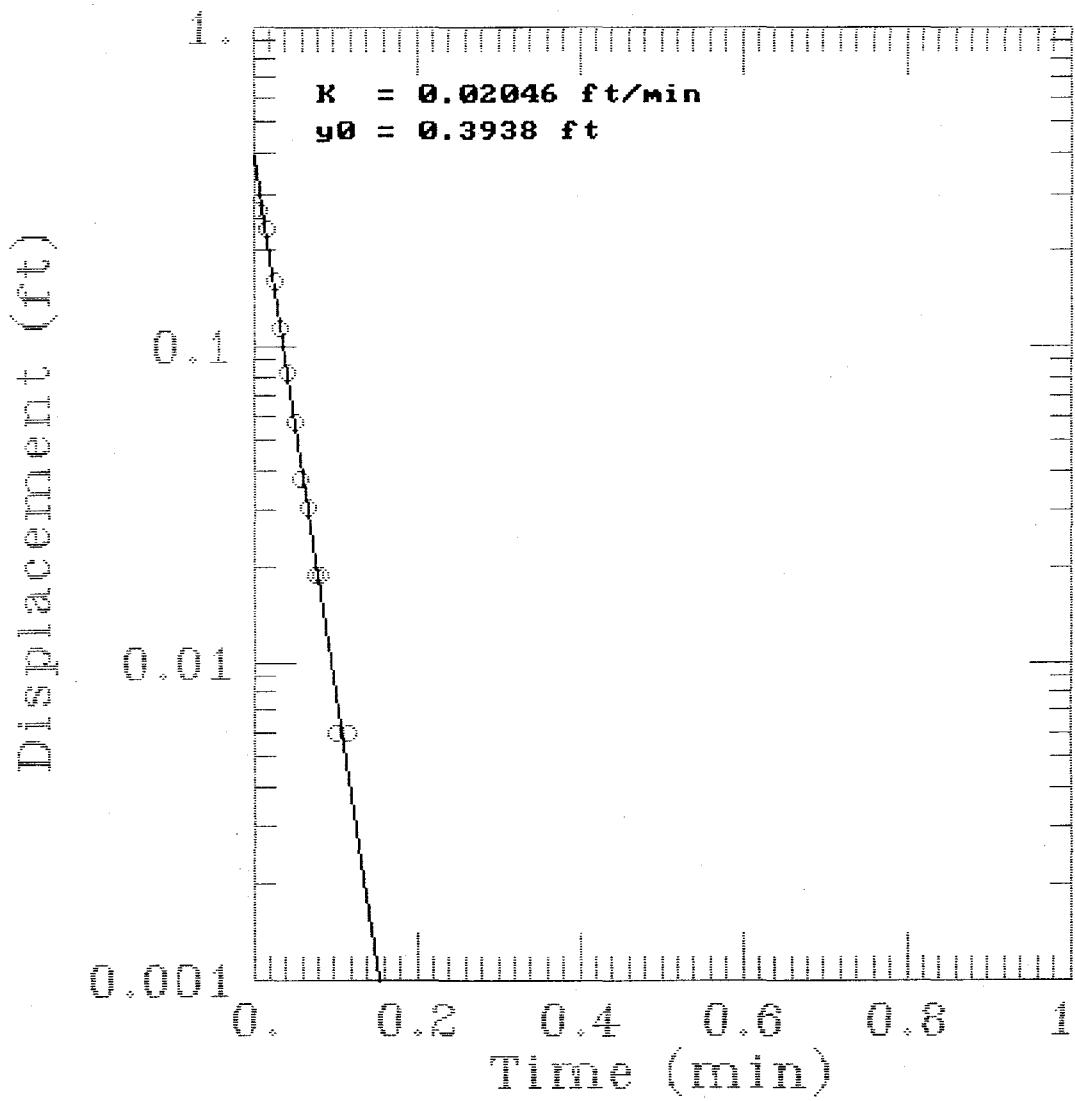
WHF-16-2S RUN #1



AQTESOLV

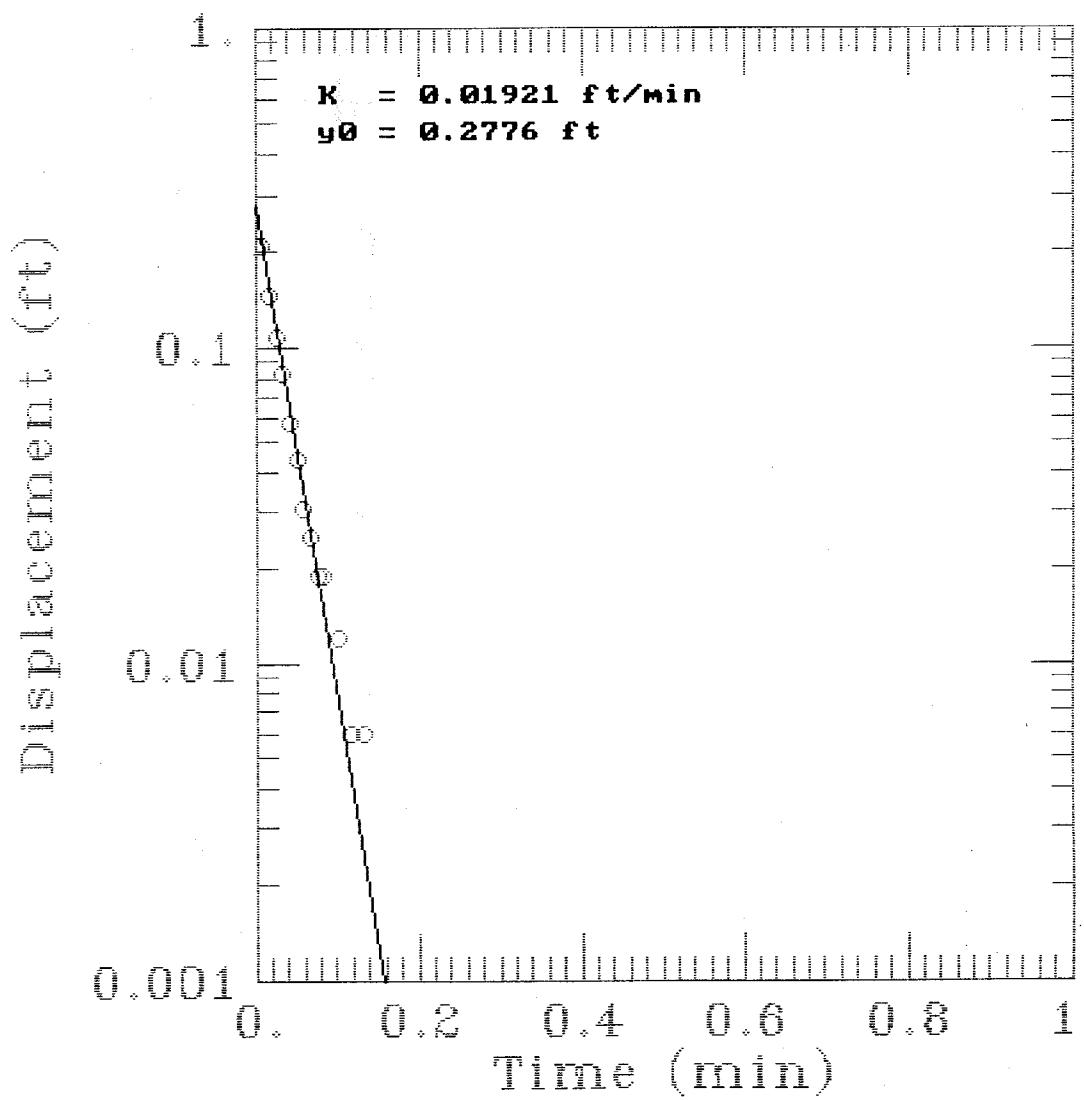


WHF-16-2S RUN #2



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WHF-16-2S RUN #3

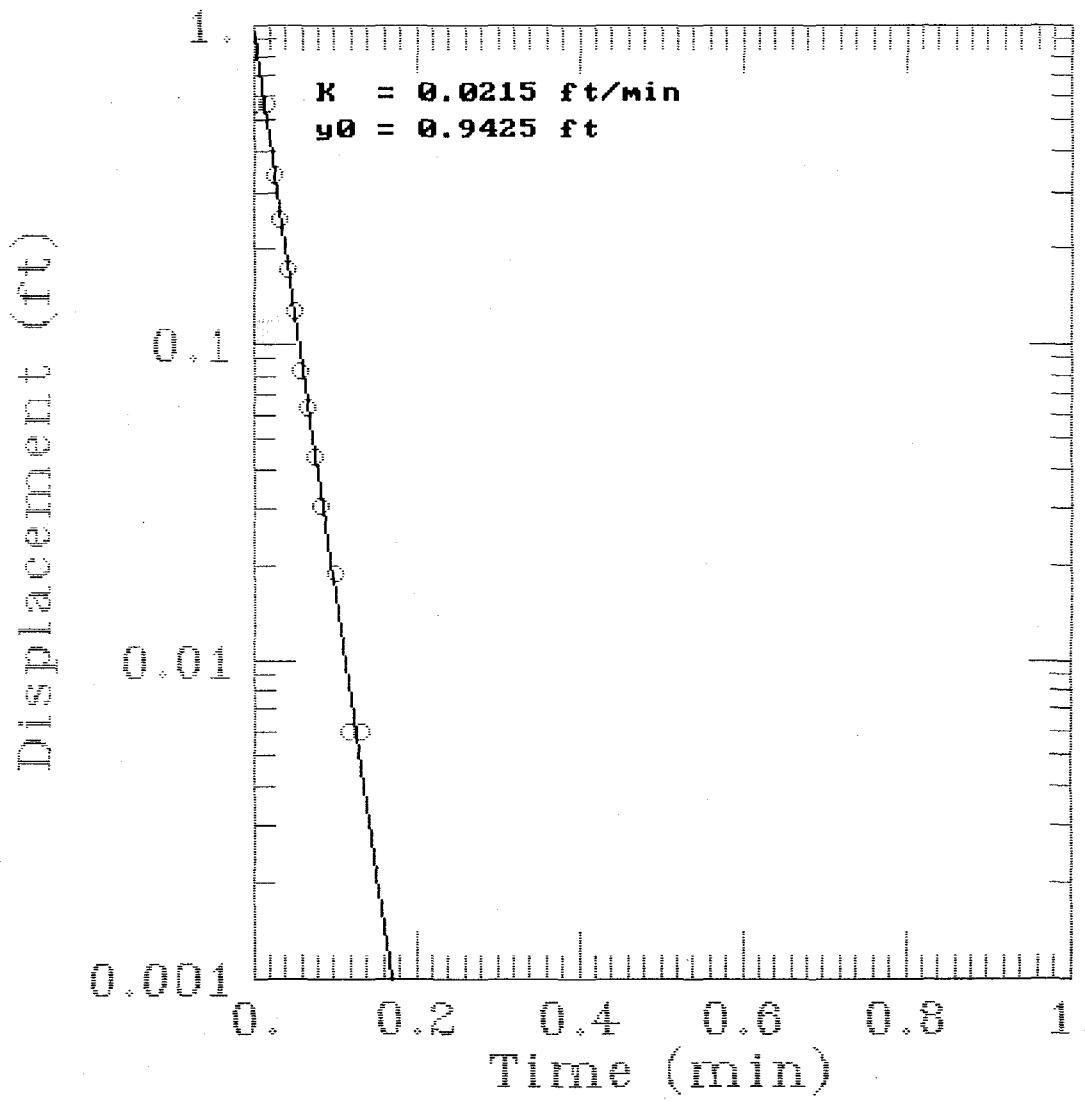


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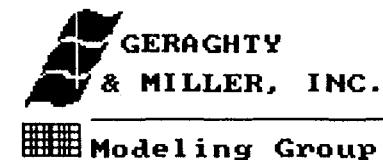


Modeling Group

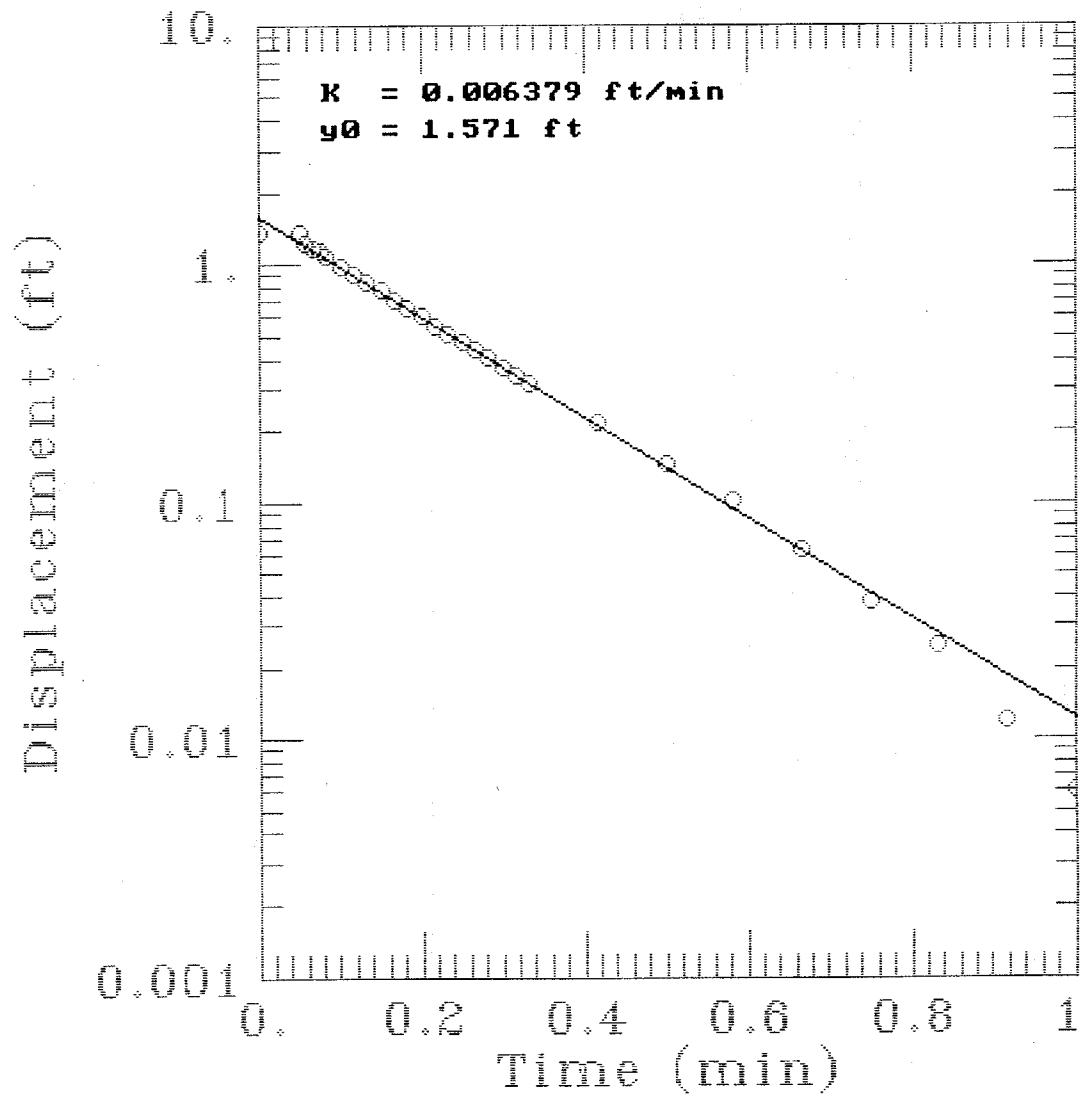
WHF-16-2S RUN #4



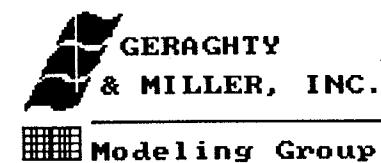
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WHF-16-2I RUN #1

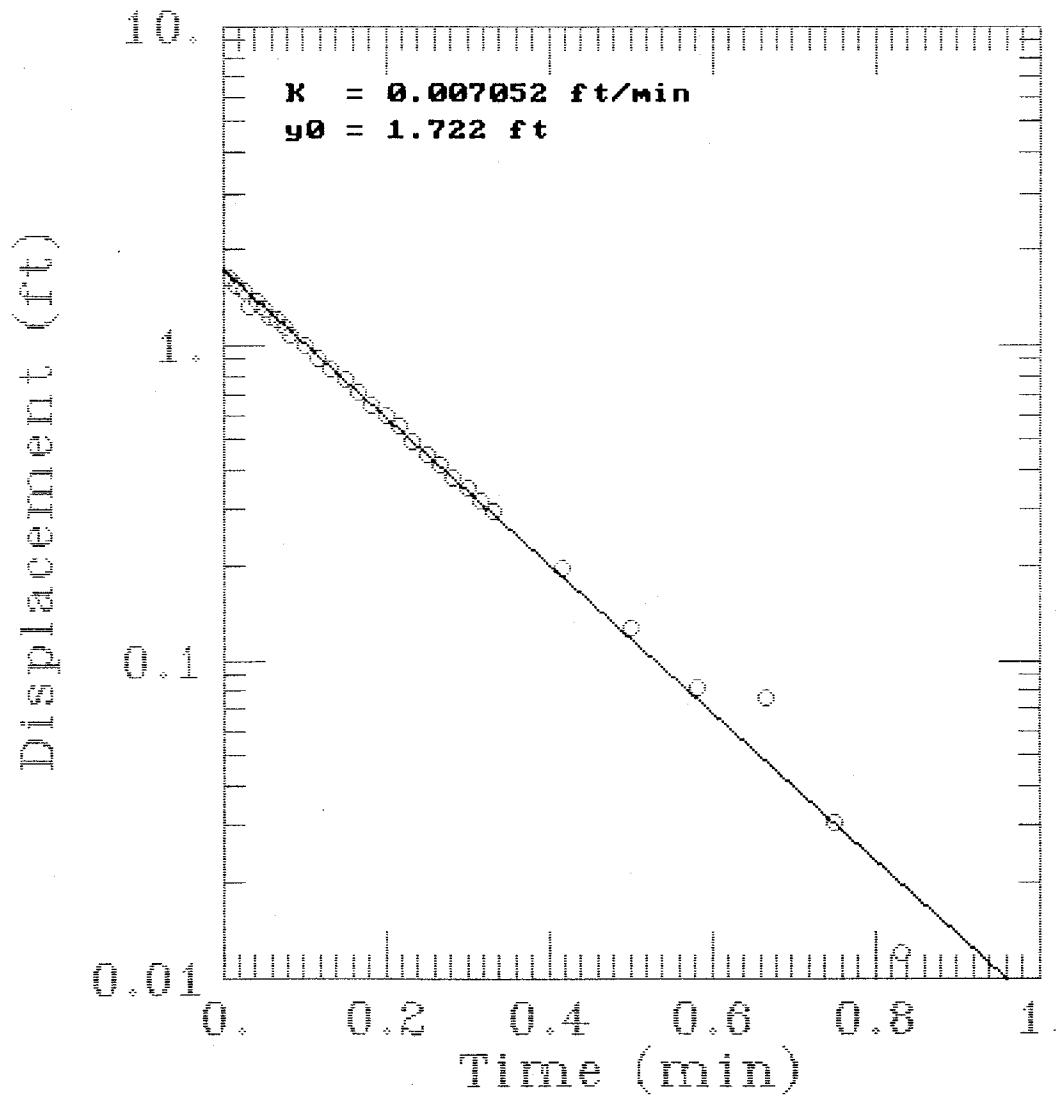


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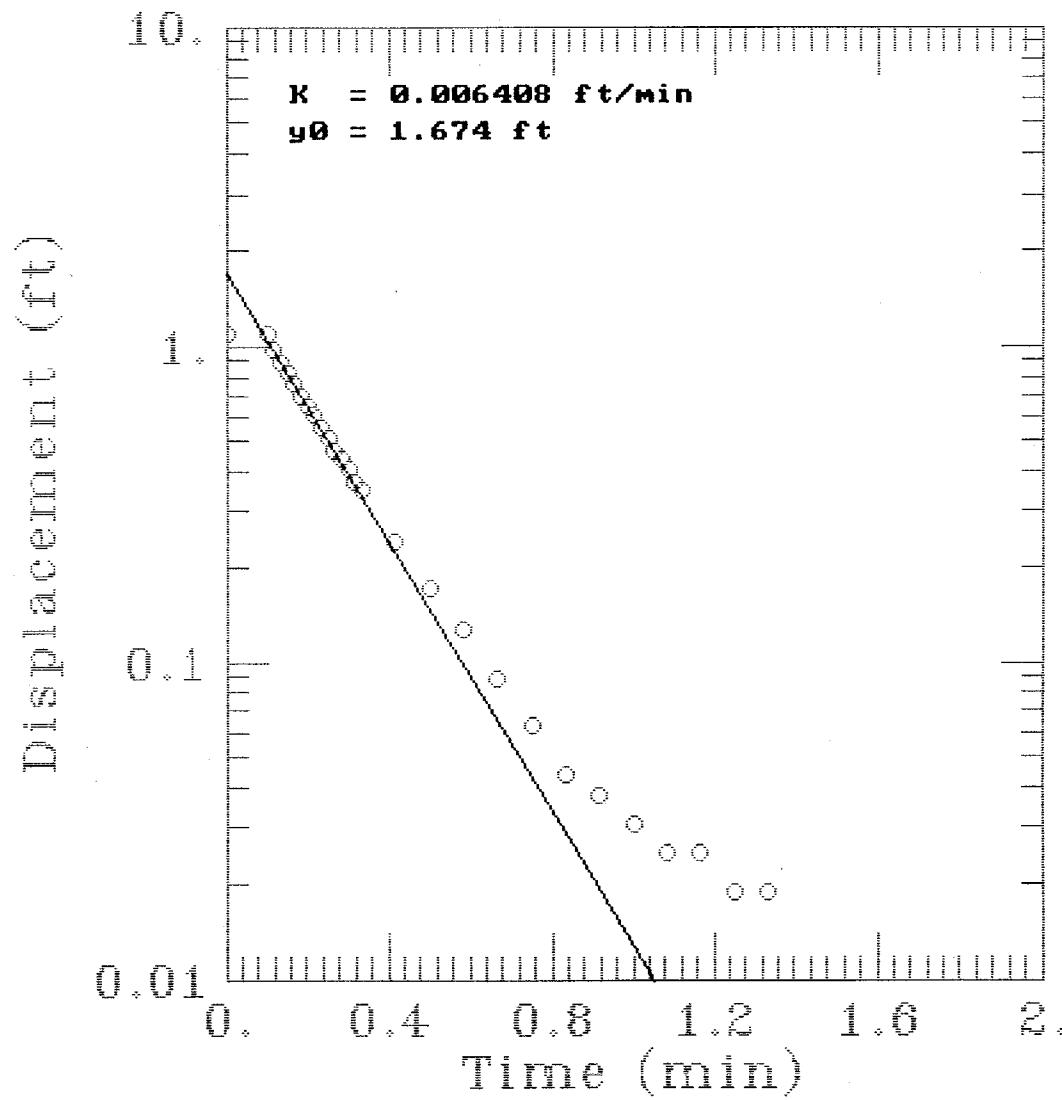
Modeling Group

WHF-16-2I RUN #2

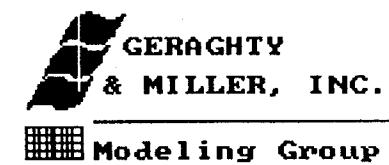


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Modeling Group

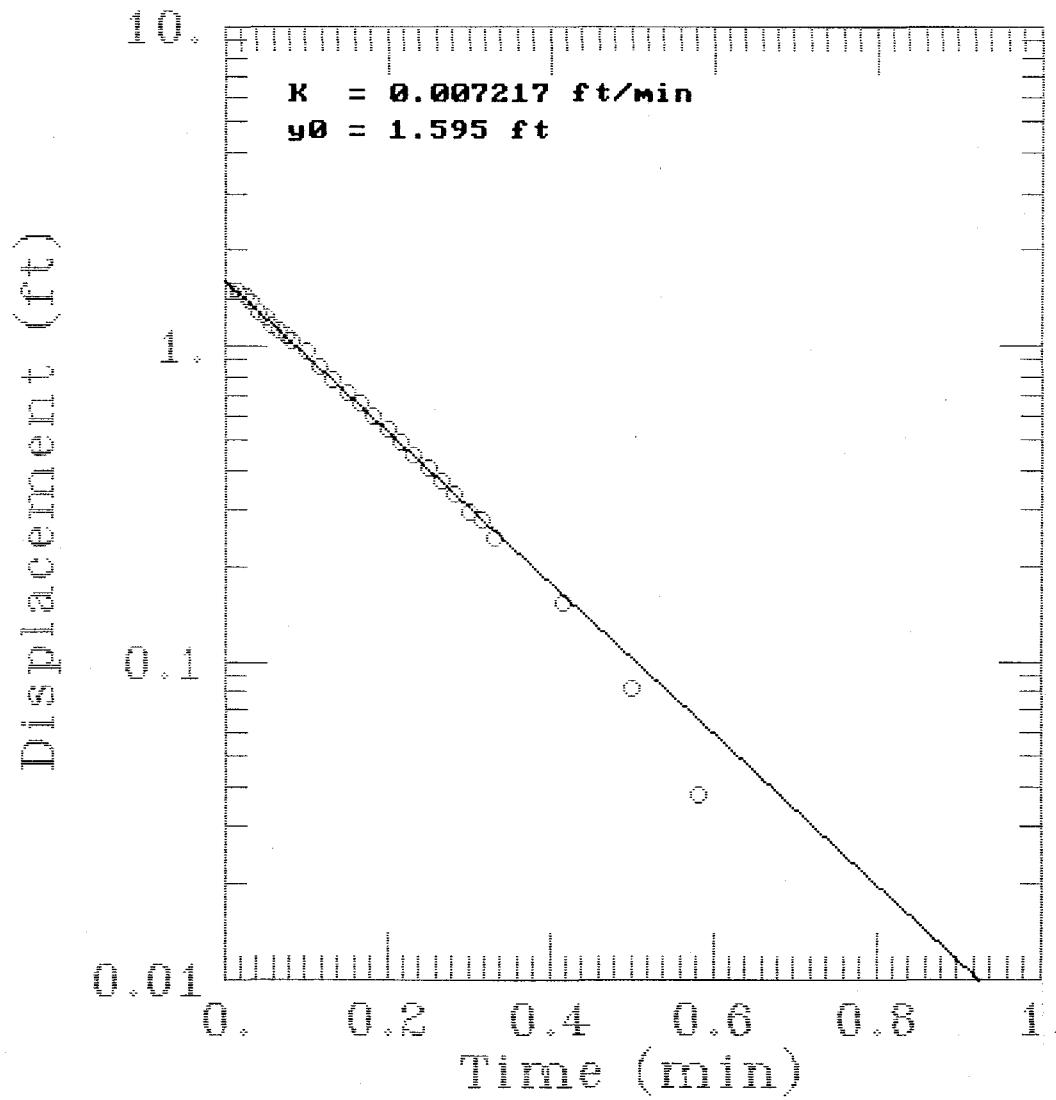
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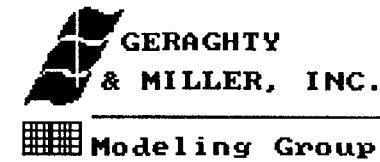
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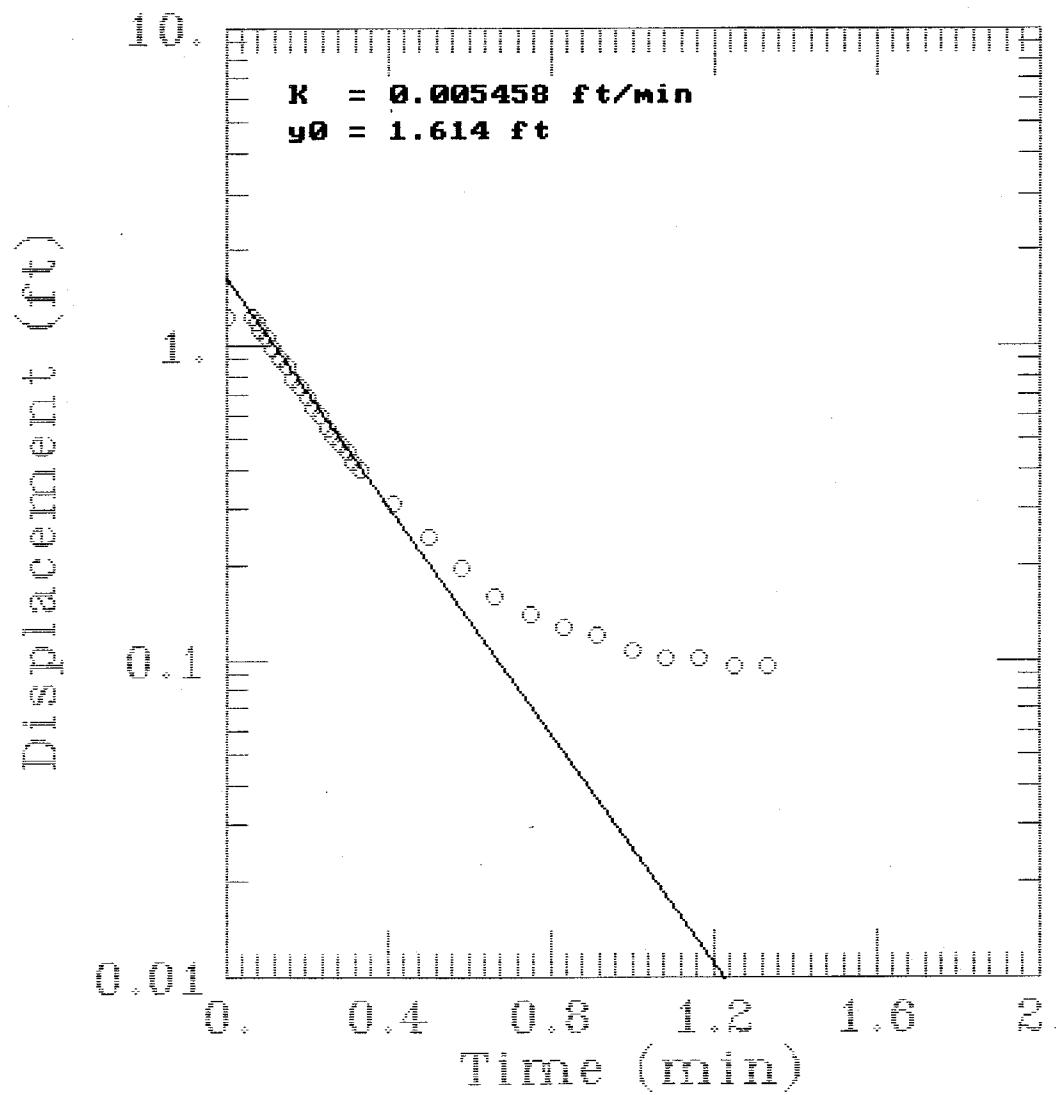
WHF-16-2I RUN #4



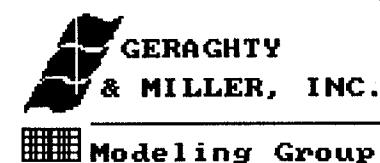
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WHF-16-2I RUN #5



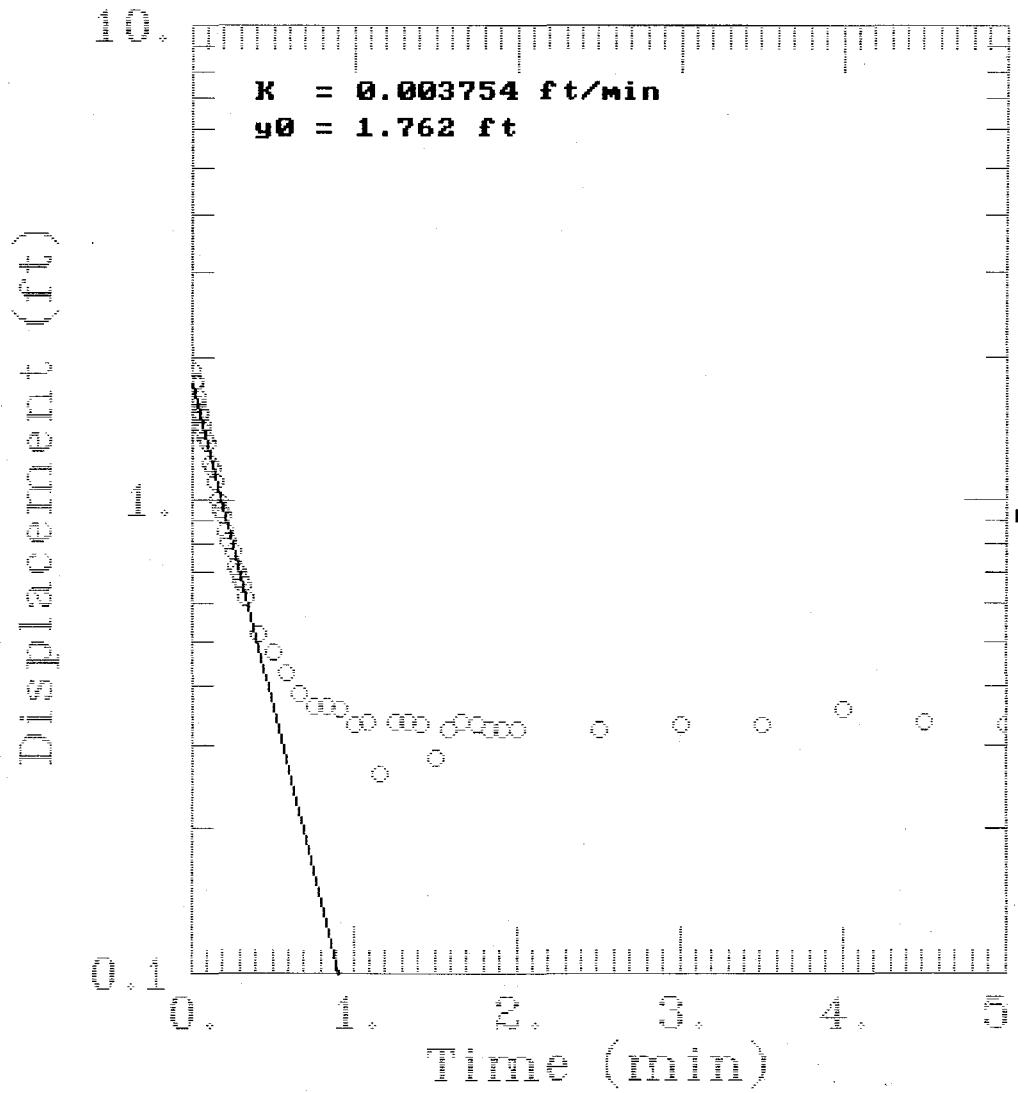
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WHF-16-2I RUN #6



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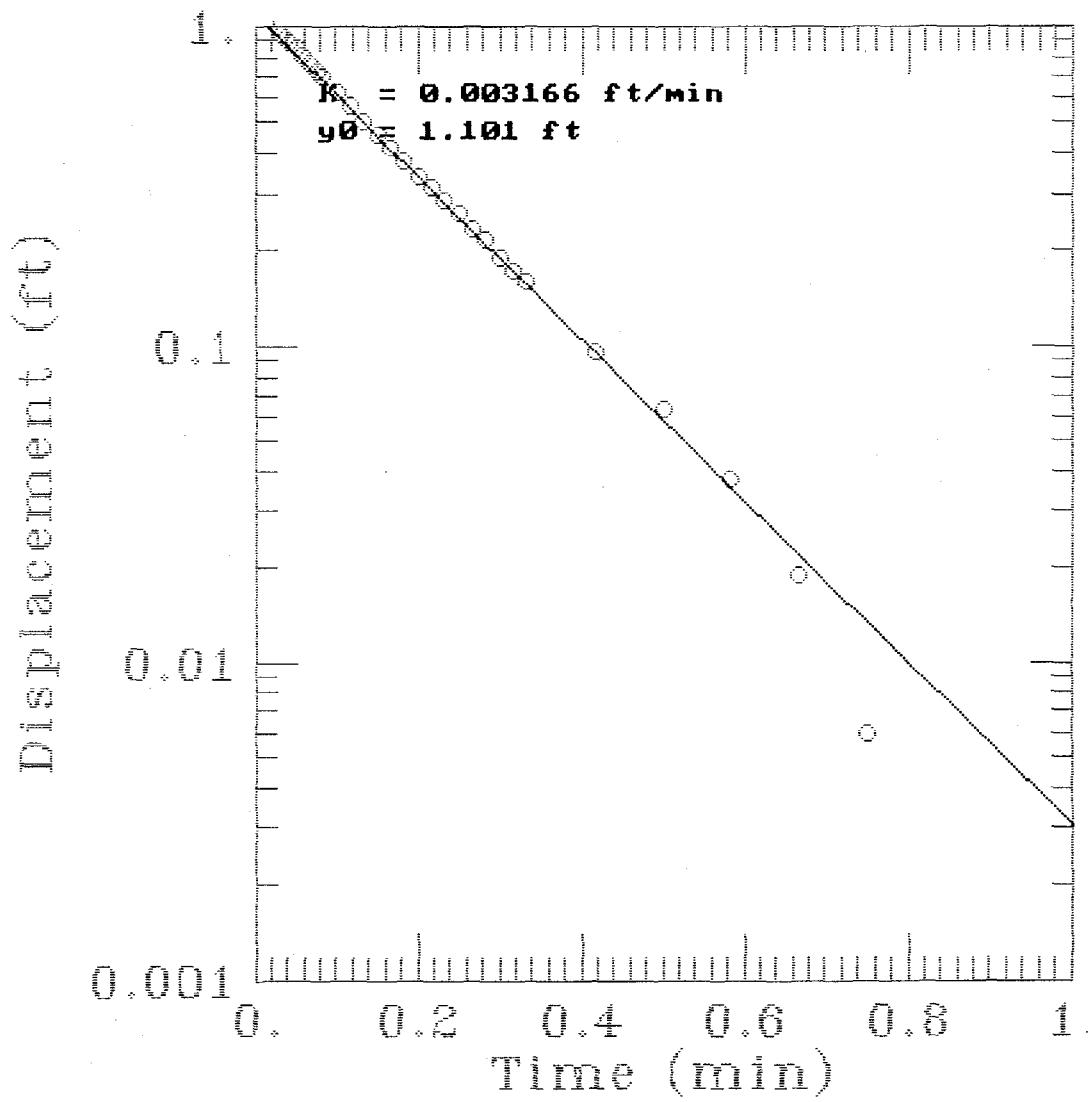
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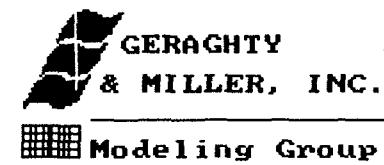
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Modeling Group

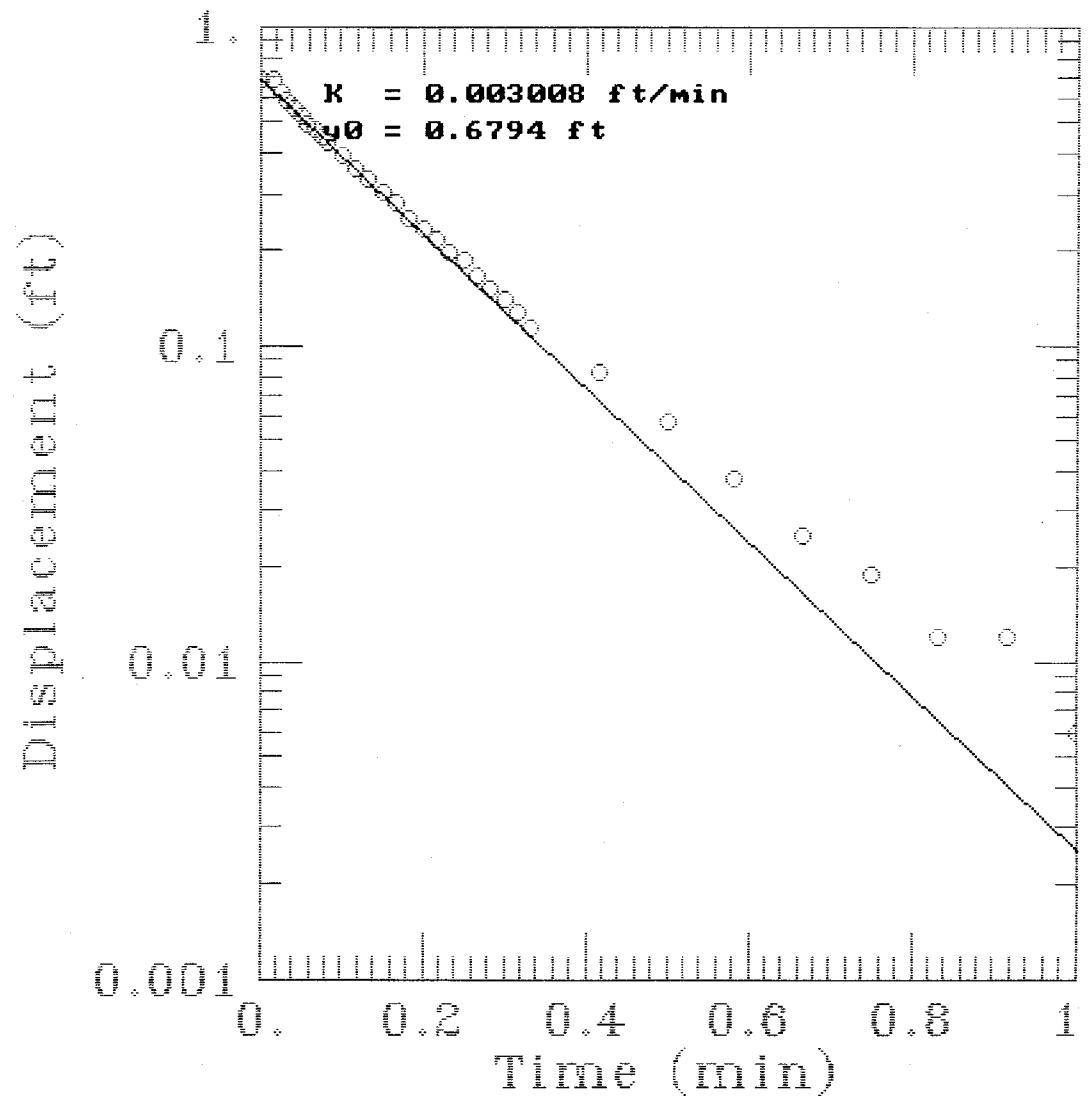
WHF-16-3S RUN #1



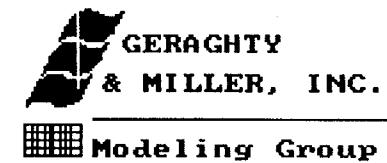
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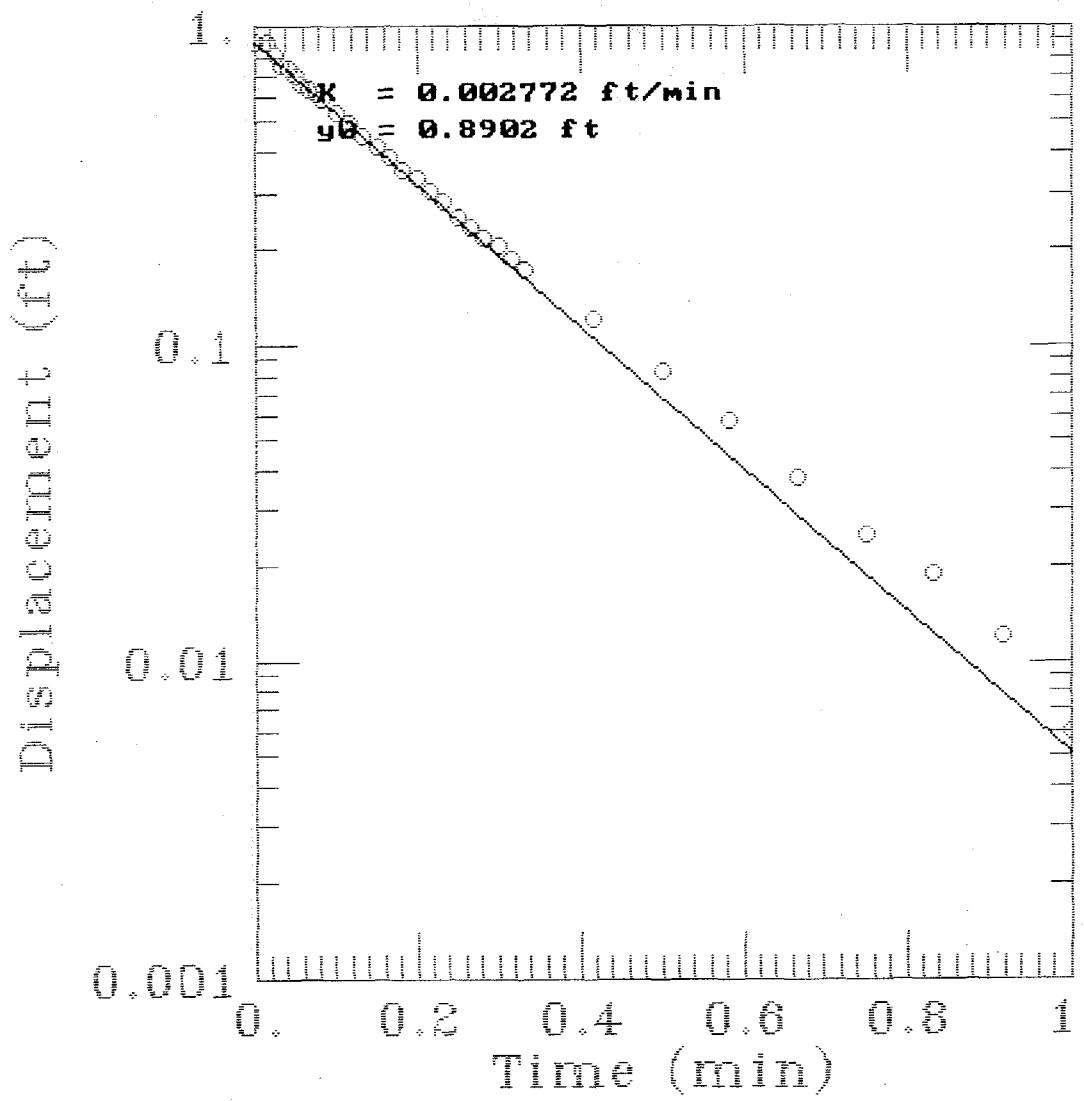
WHF-16-3S RUN #2



AQTESOLV



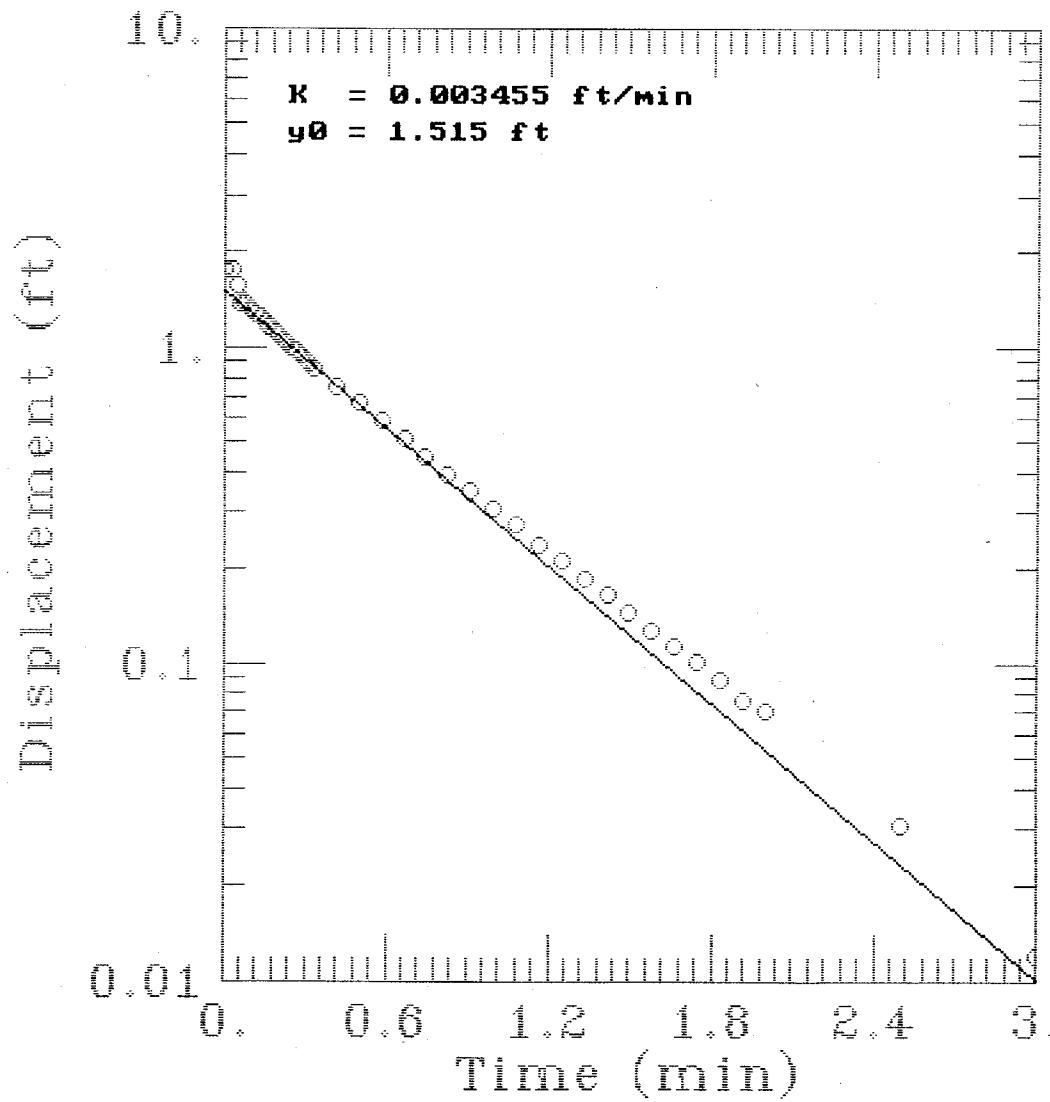
WHF-16-3S RUN #3



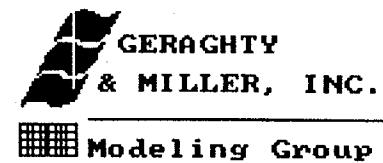
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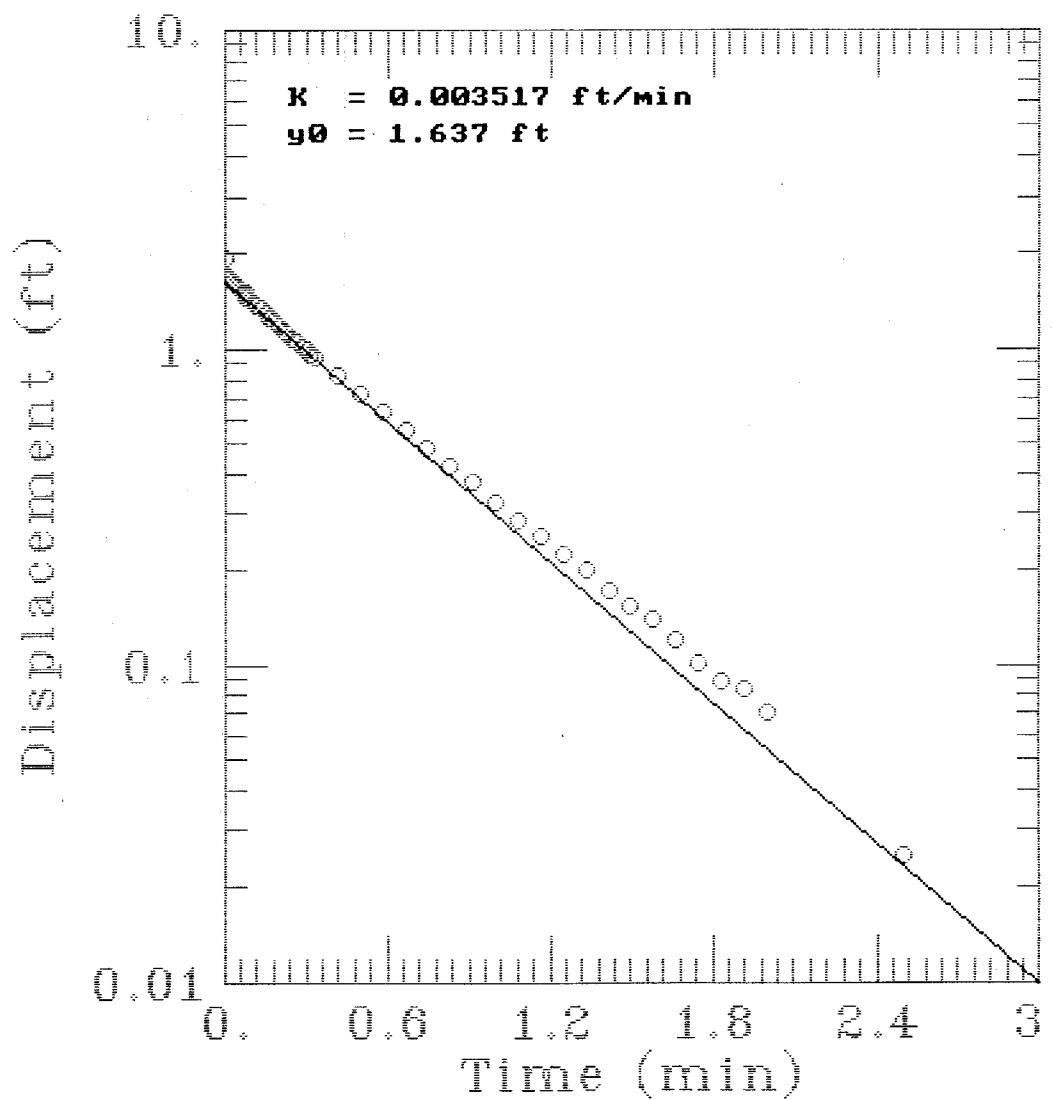
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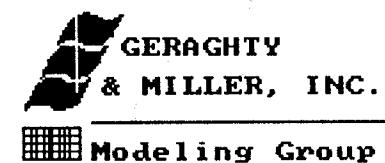
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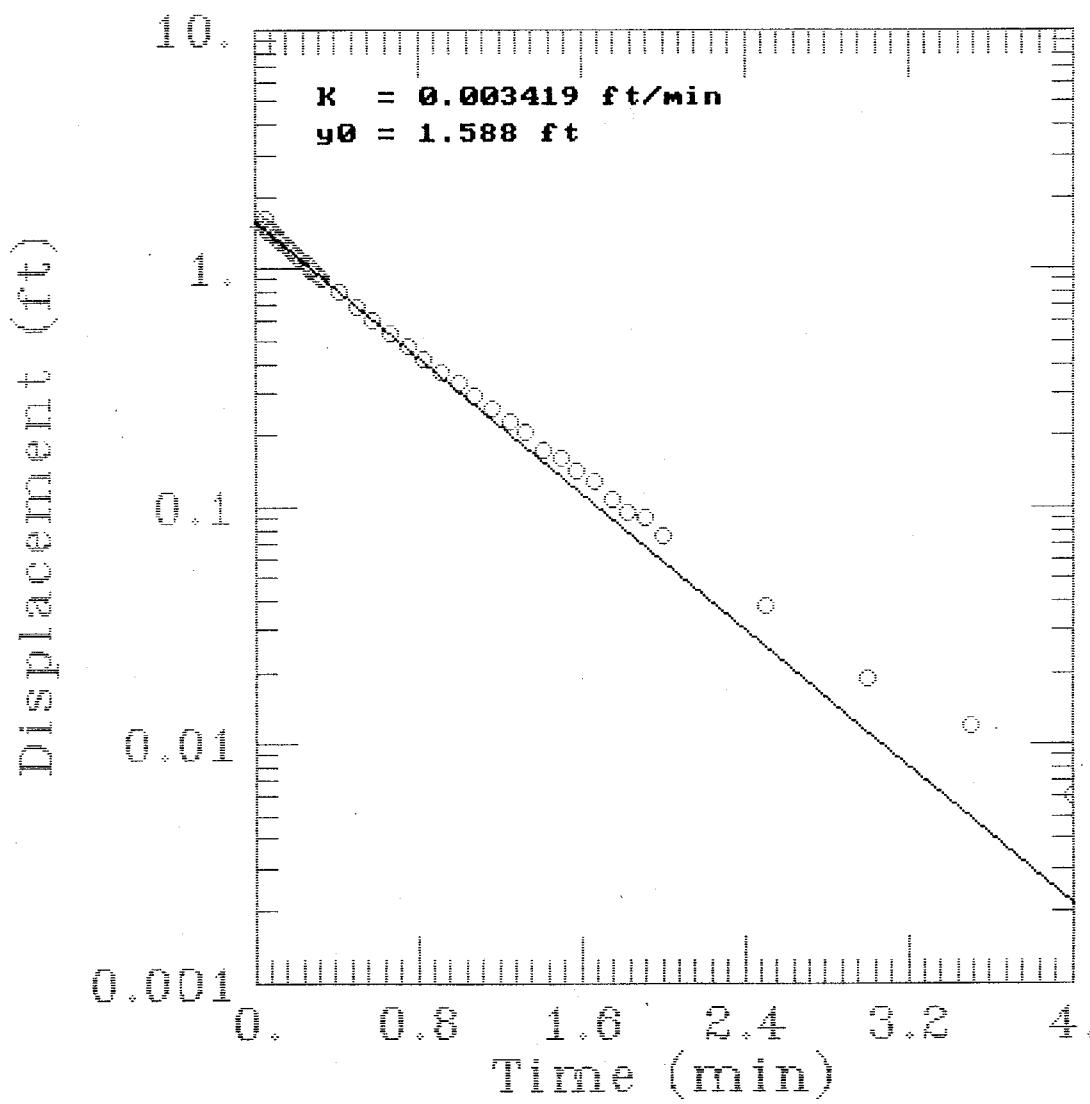


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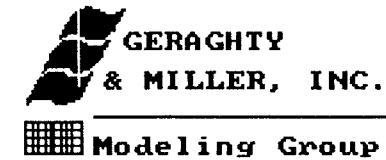


Modeling Group

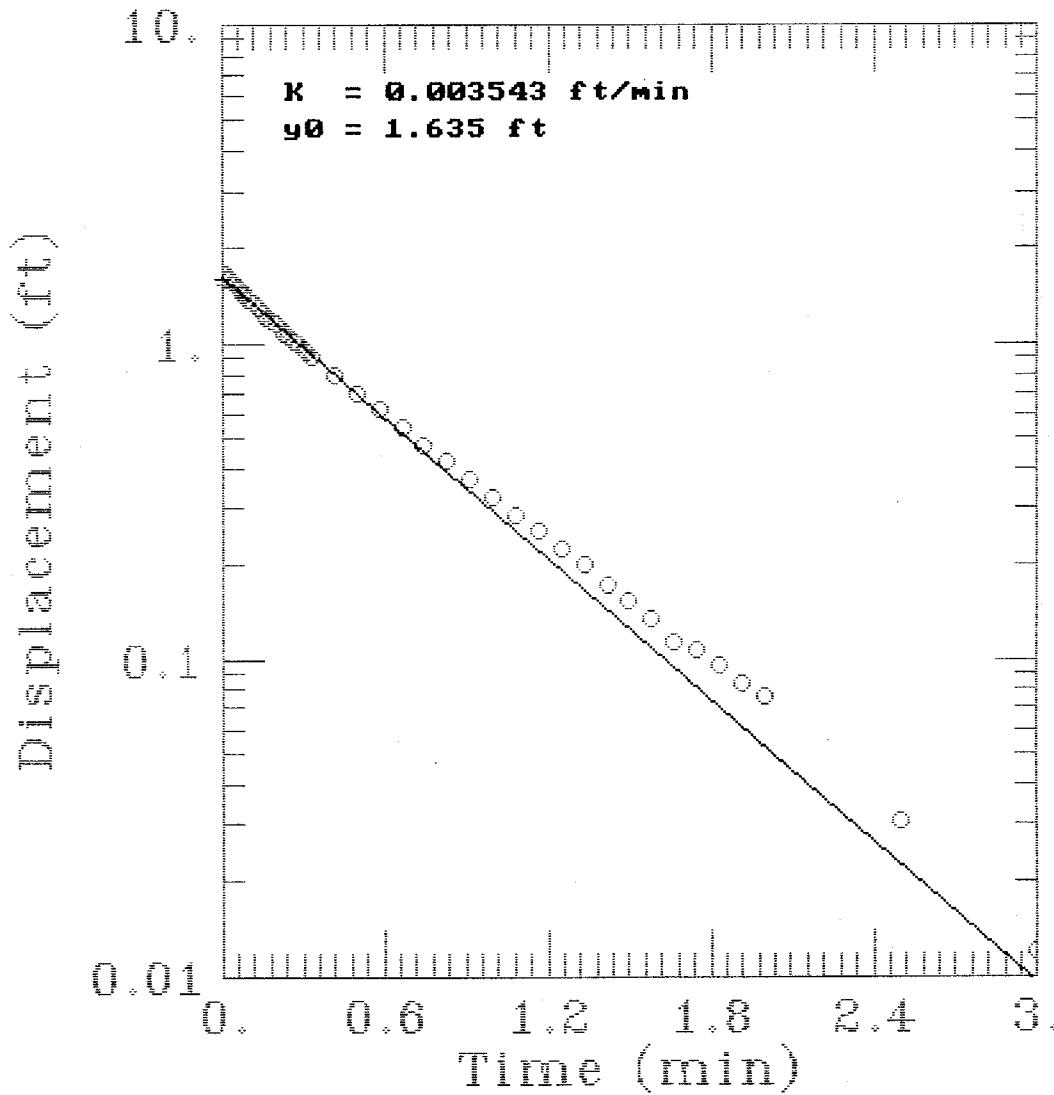
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WHF-16-3I RUN #4

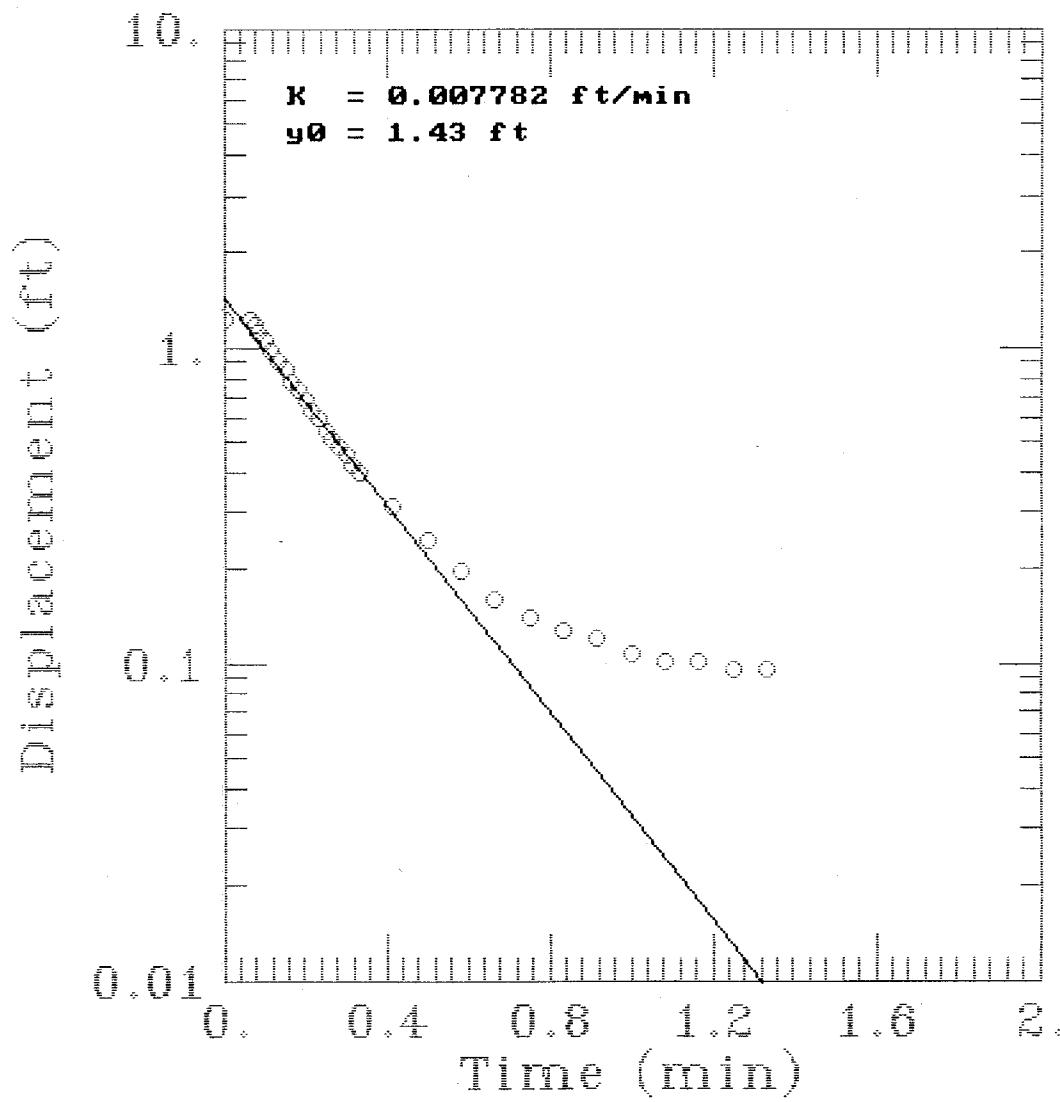


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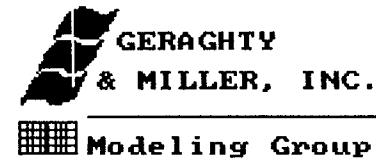


Modeling Group

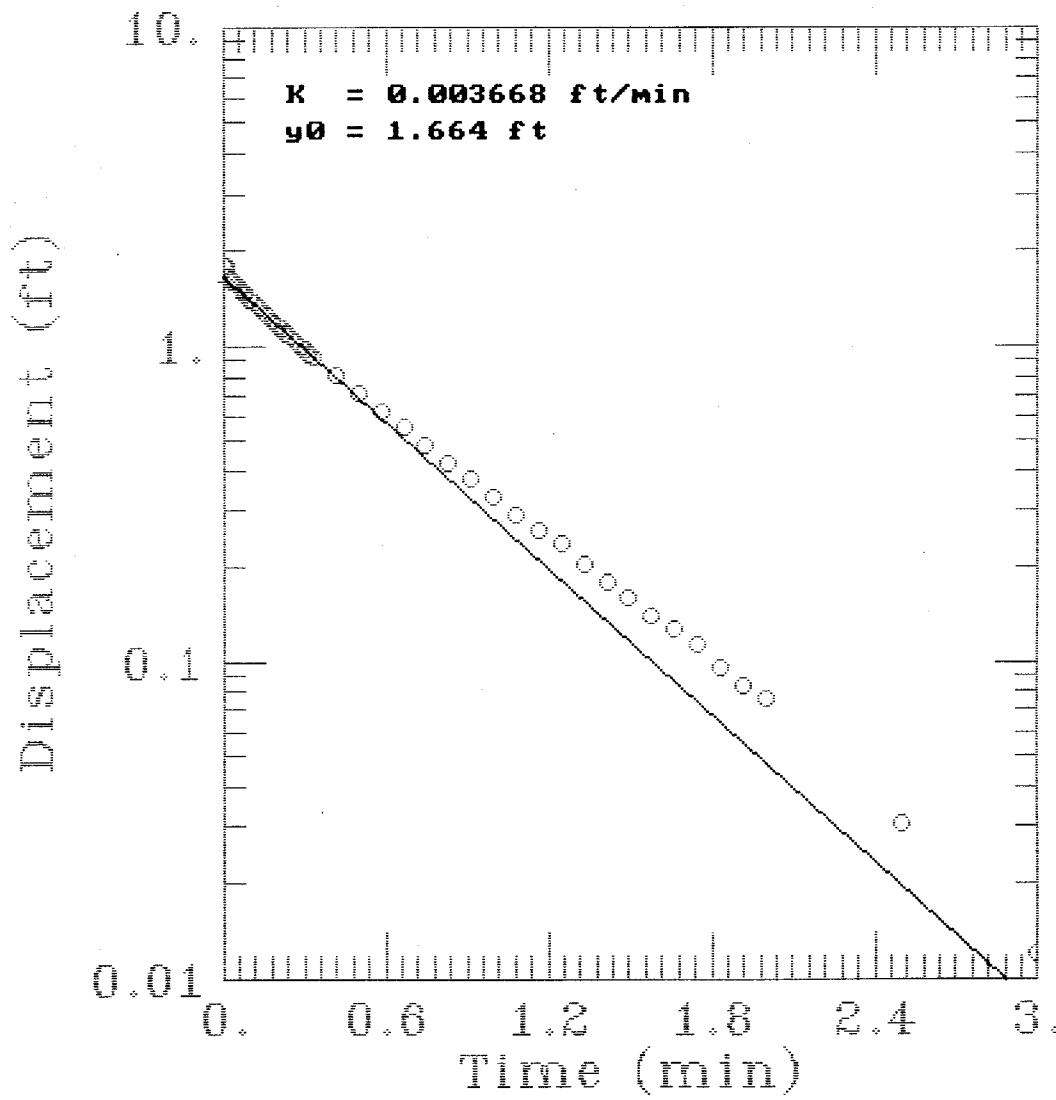
WHF-16-3I RUN #5



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WHF-16-3I RUN #6



AQTESOLV

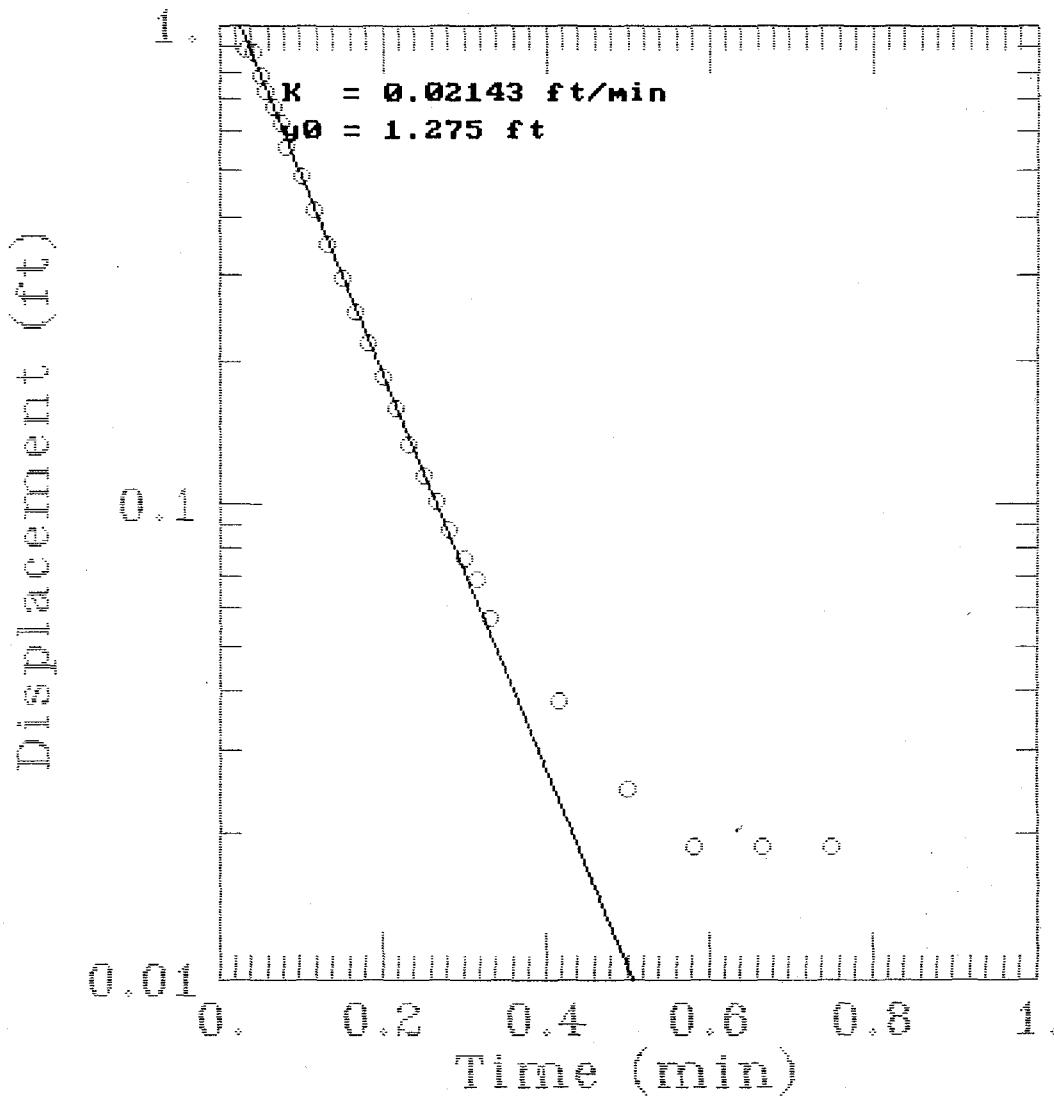


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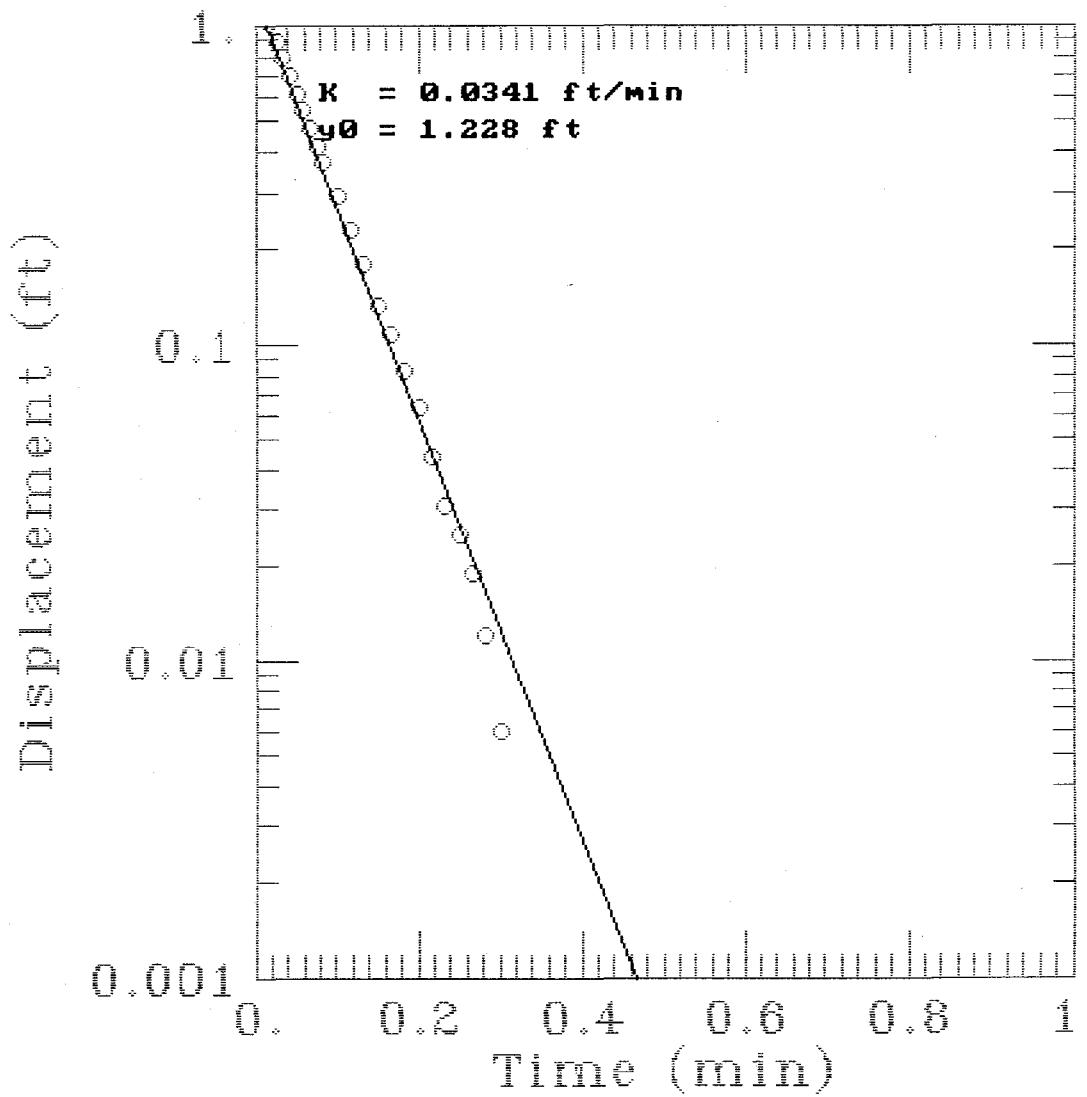
Modeling Group

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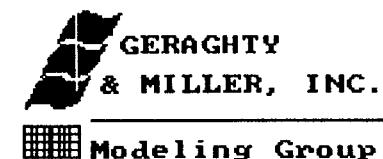


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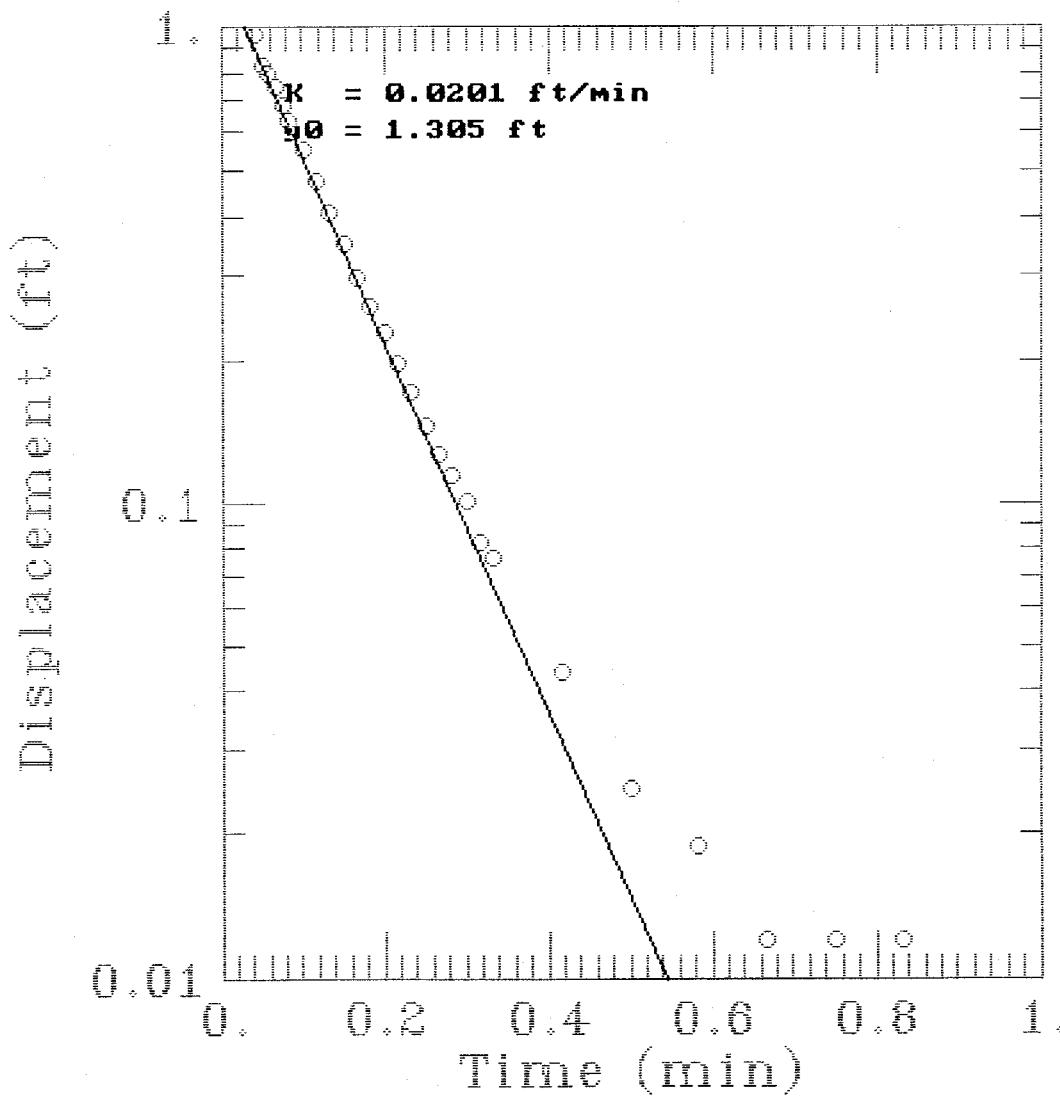
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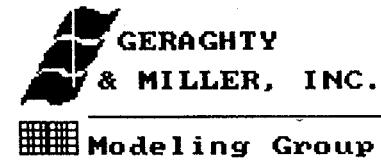
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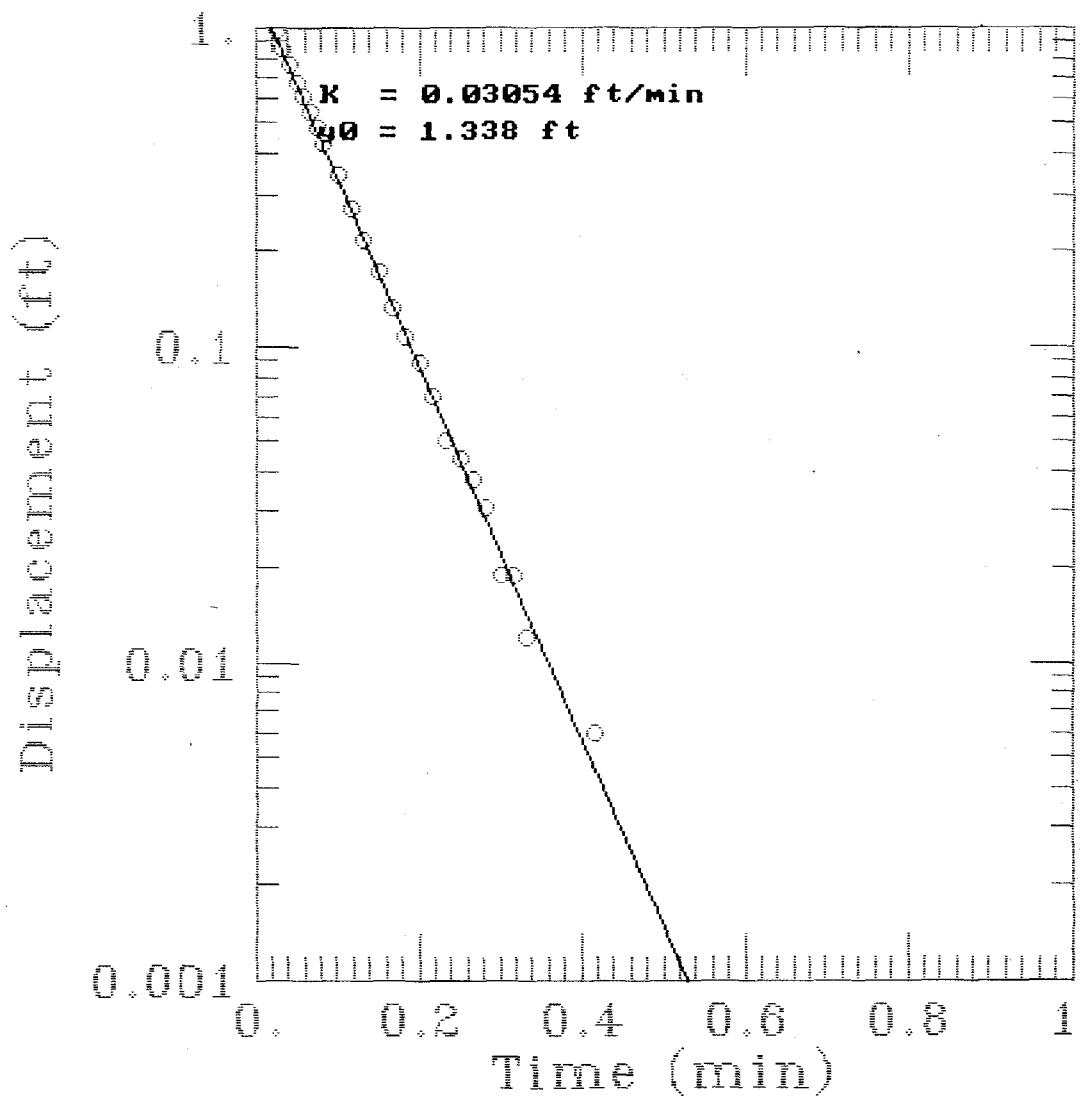
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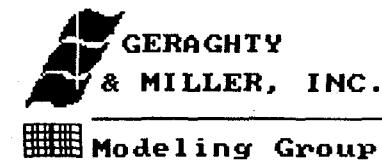
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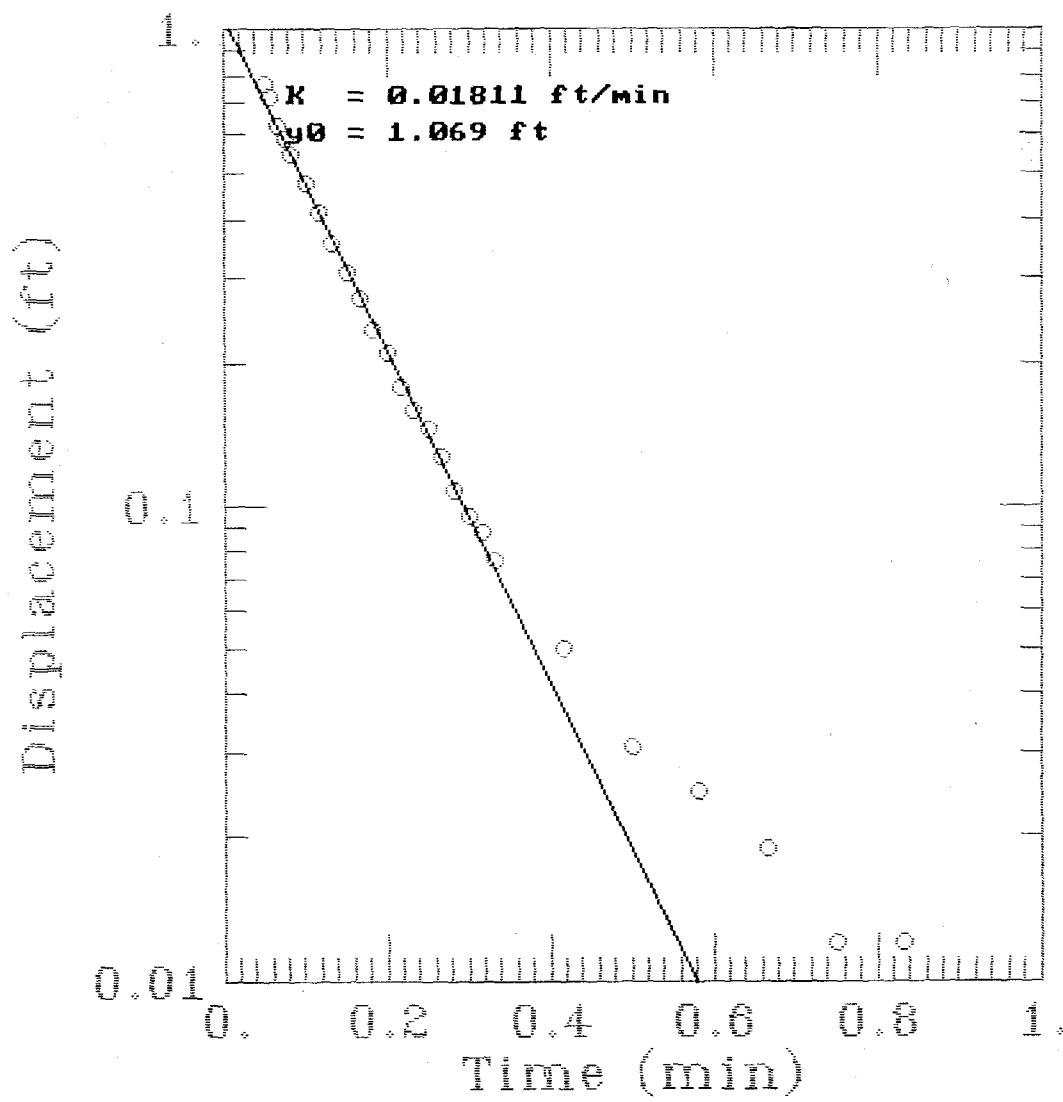
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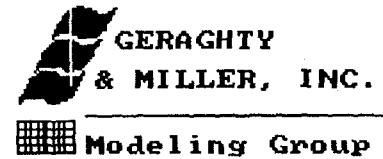
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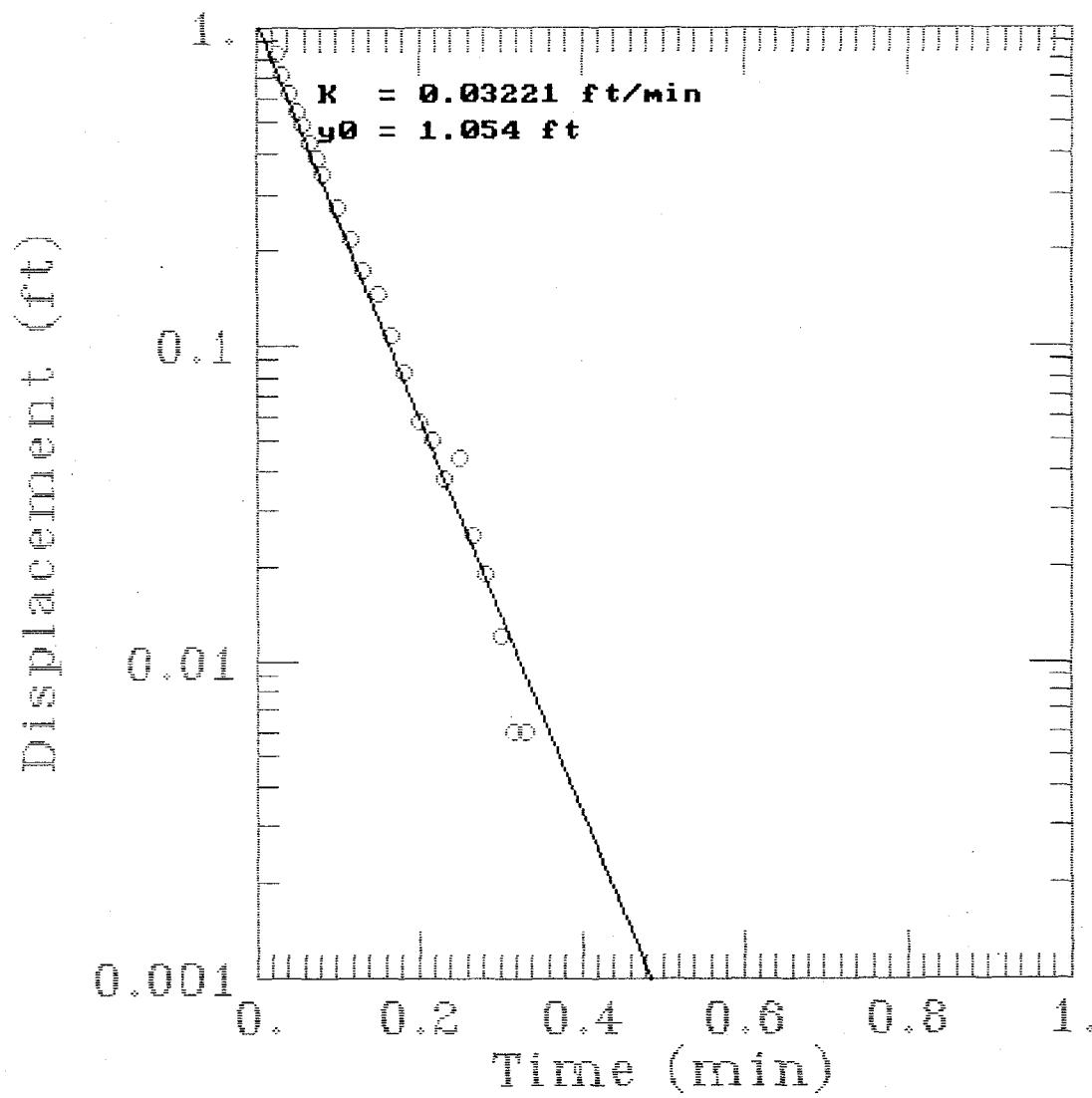
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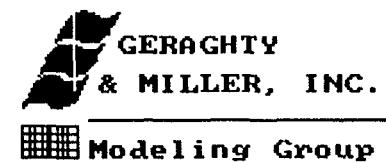
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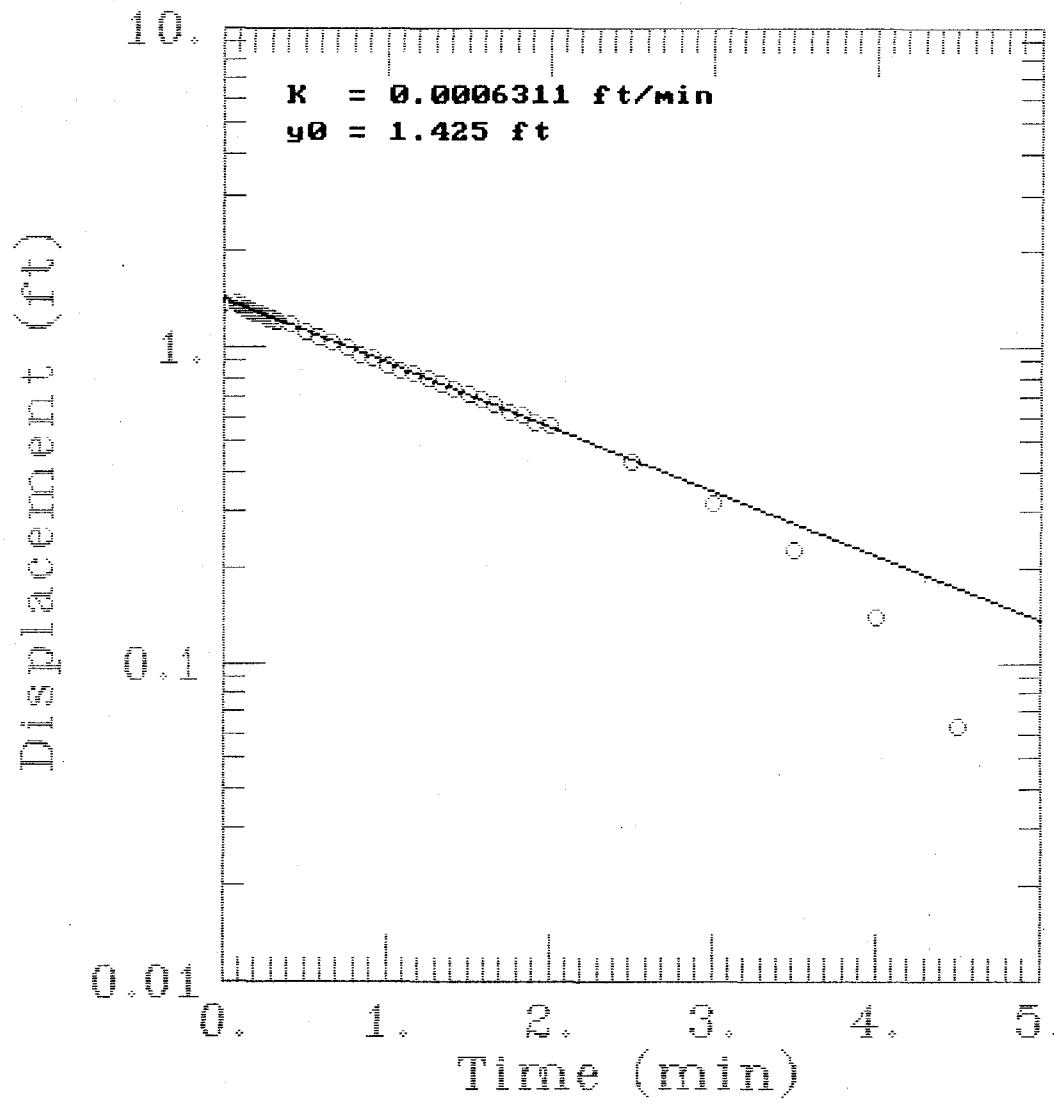
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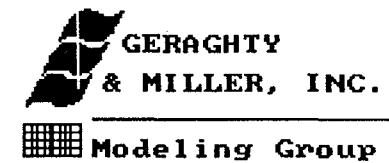
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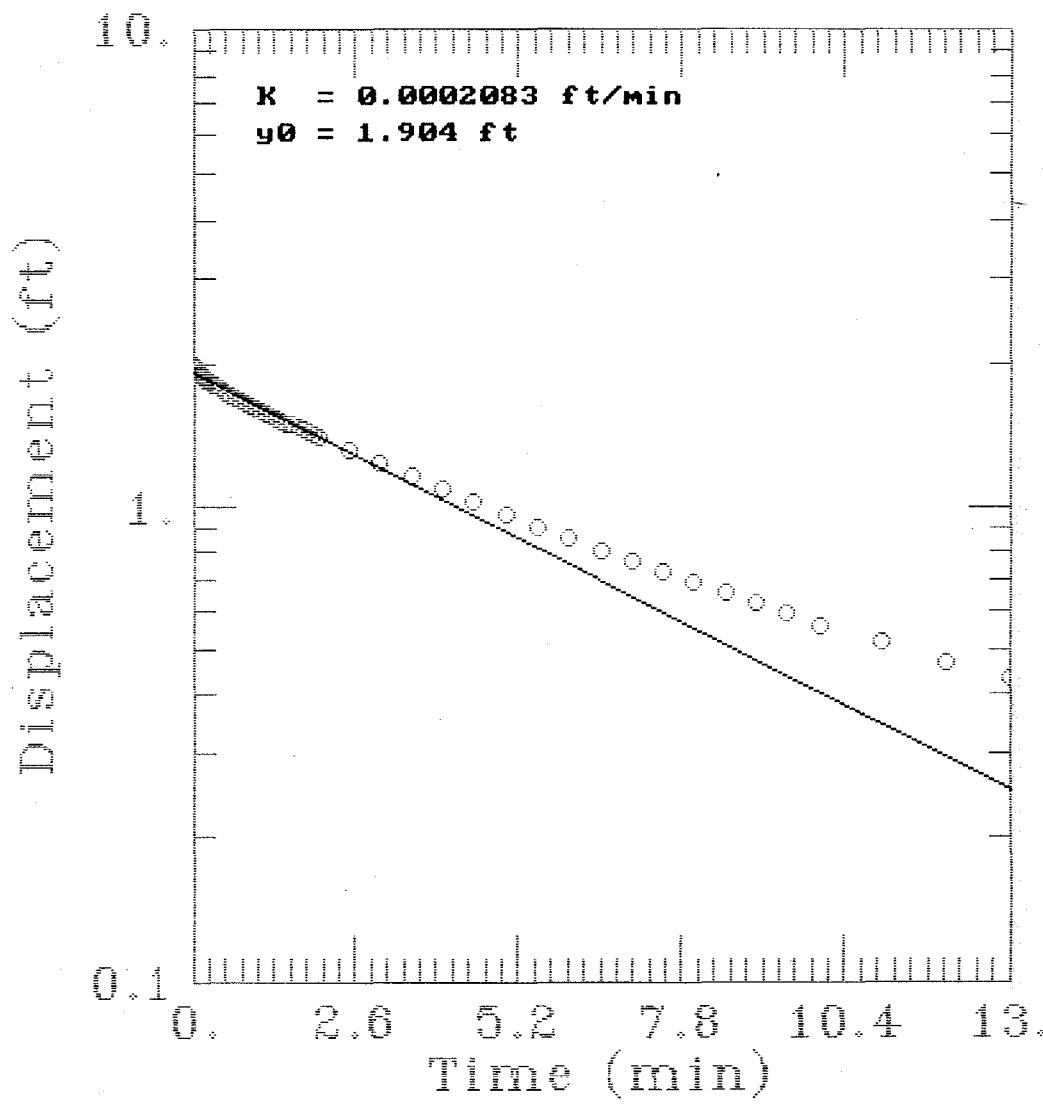
WHF-16-3D RUN #1



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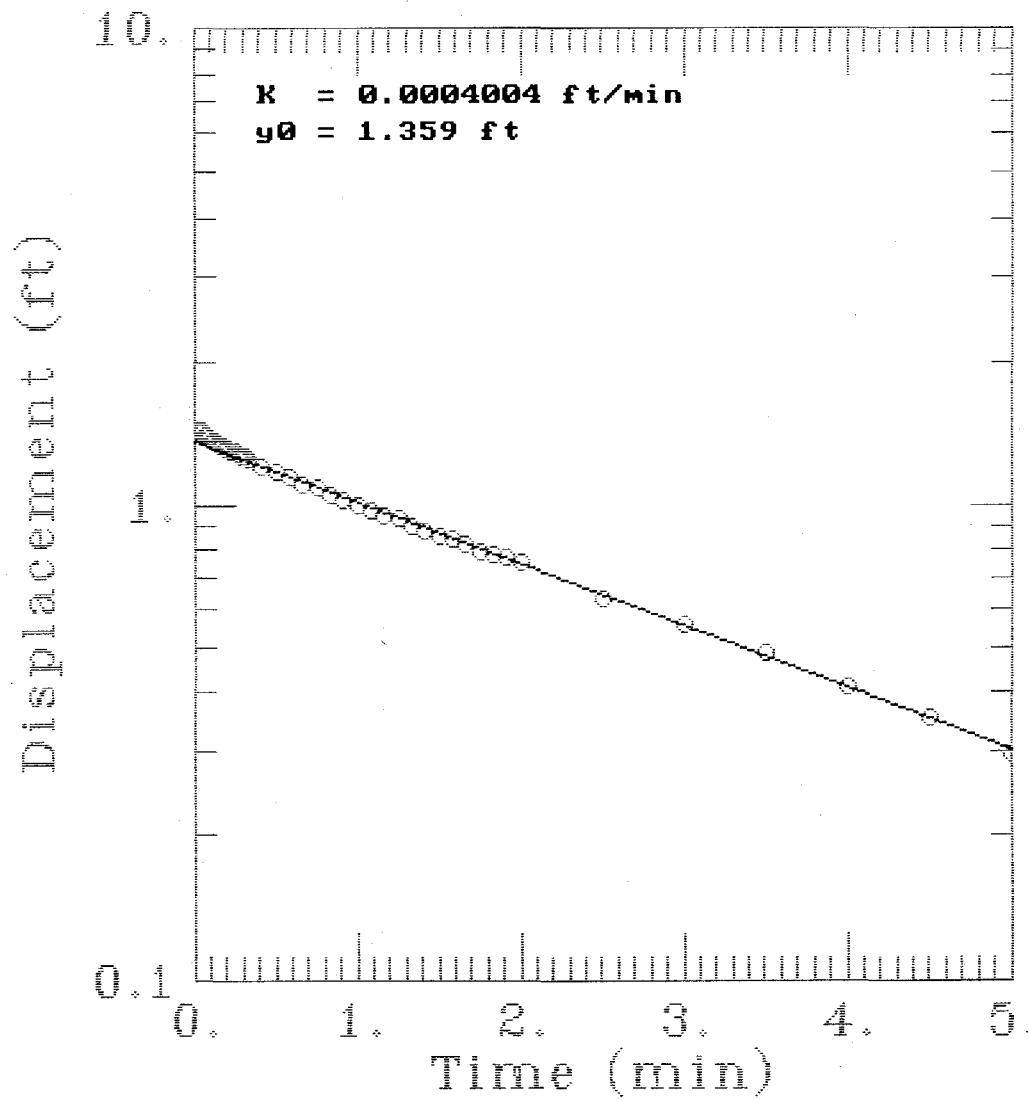


WHF-16-3D RUN #2

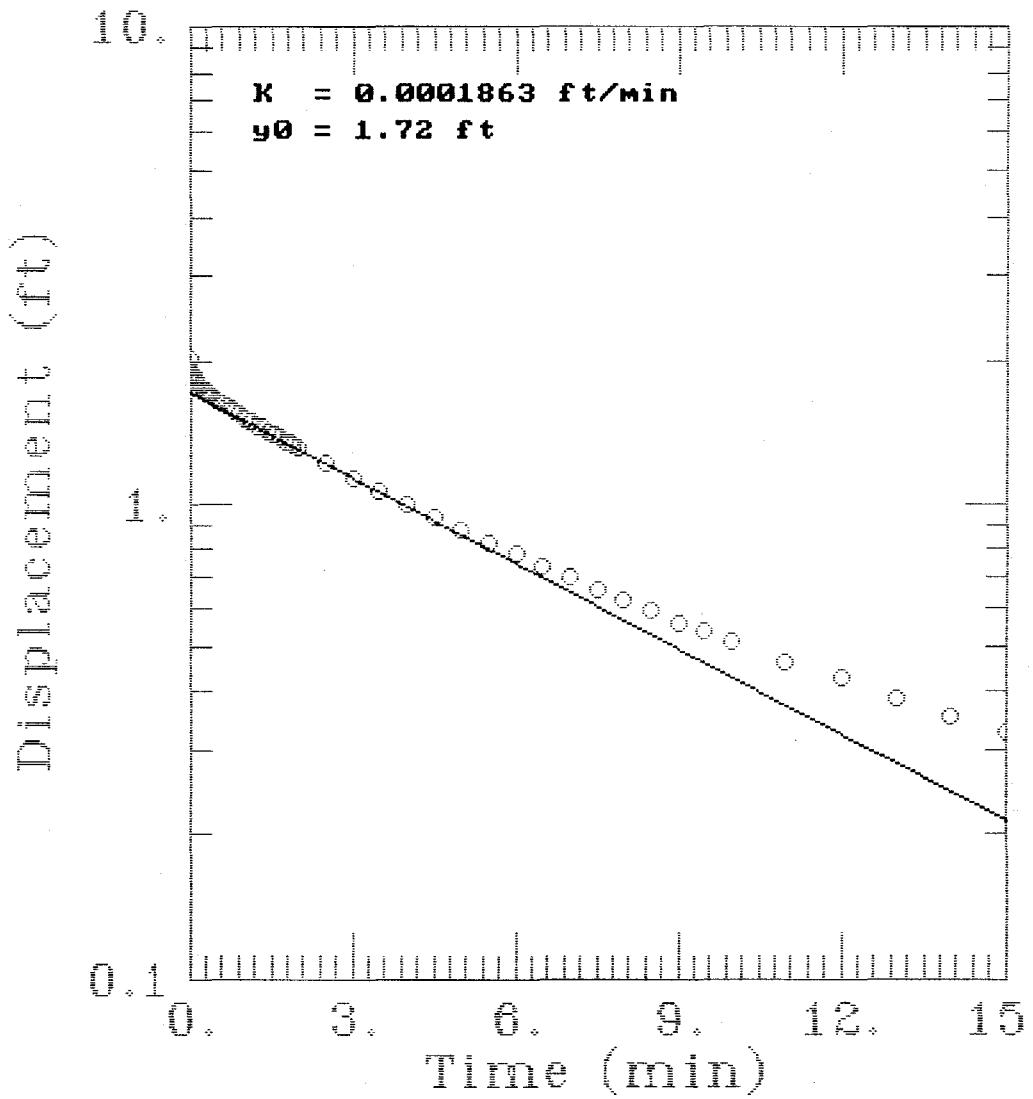


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WHF-16-3D RUN #3

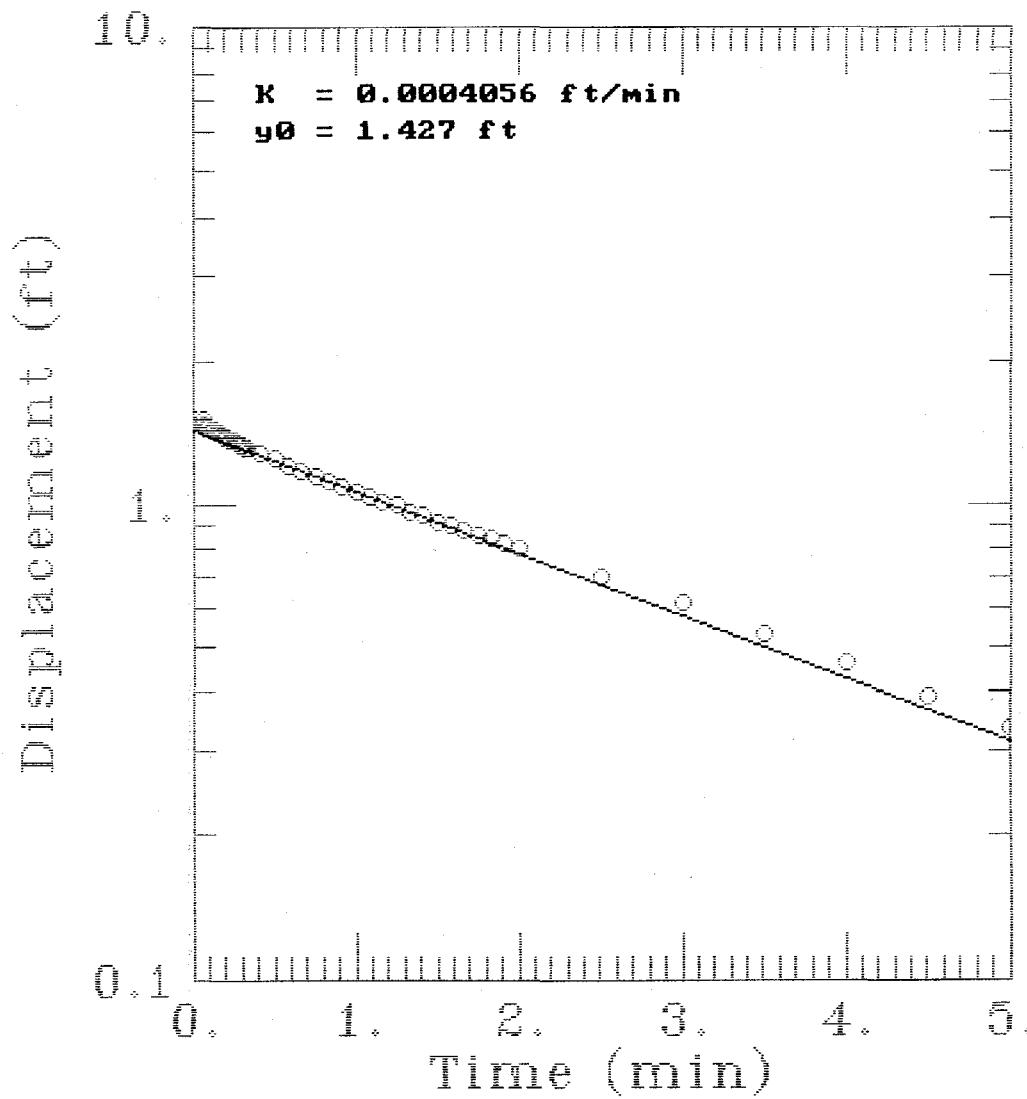


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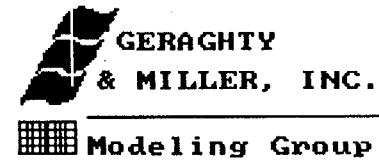


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WHF-16-3D RUN #5



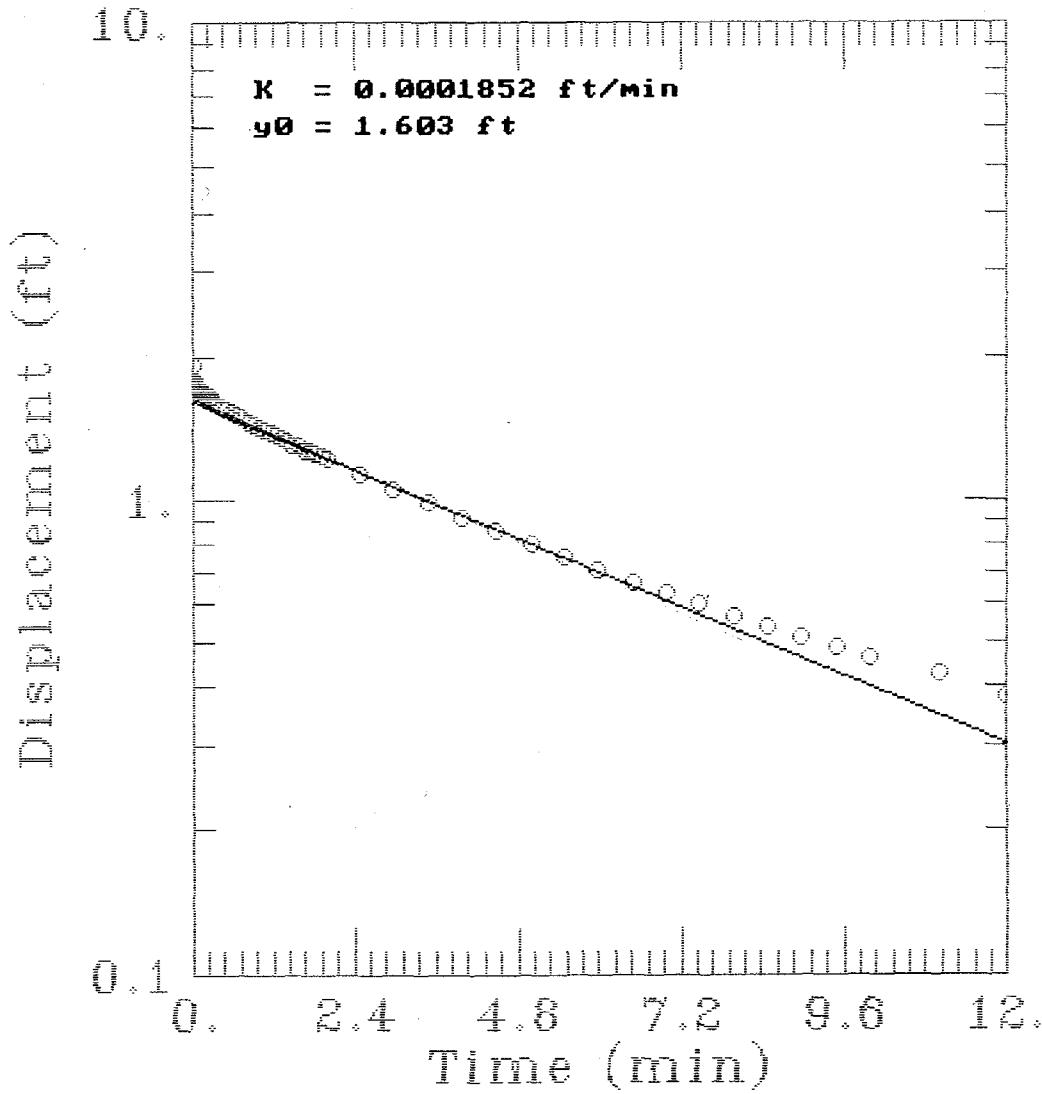
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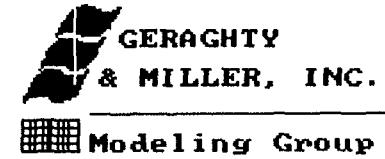
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& MILLER, INC.

Modeling Group

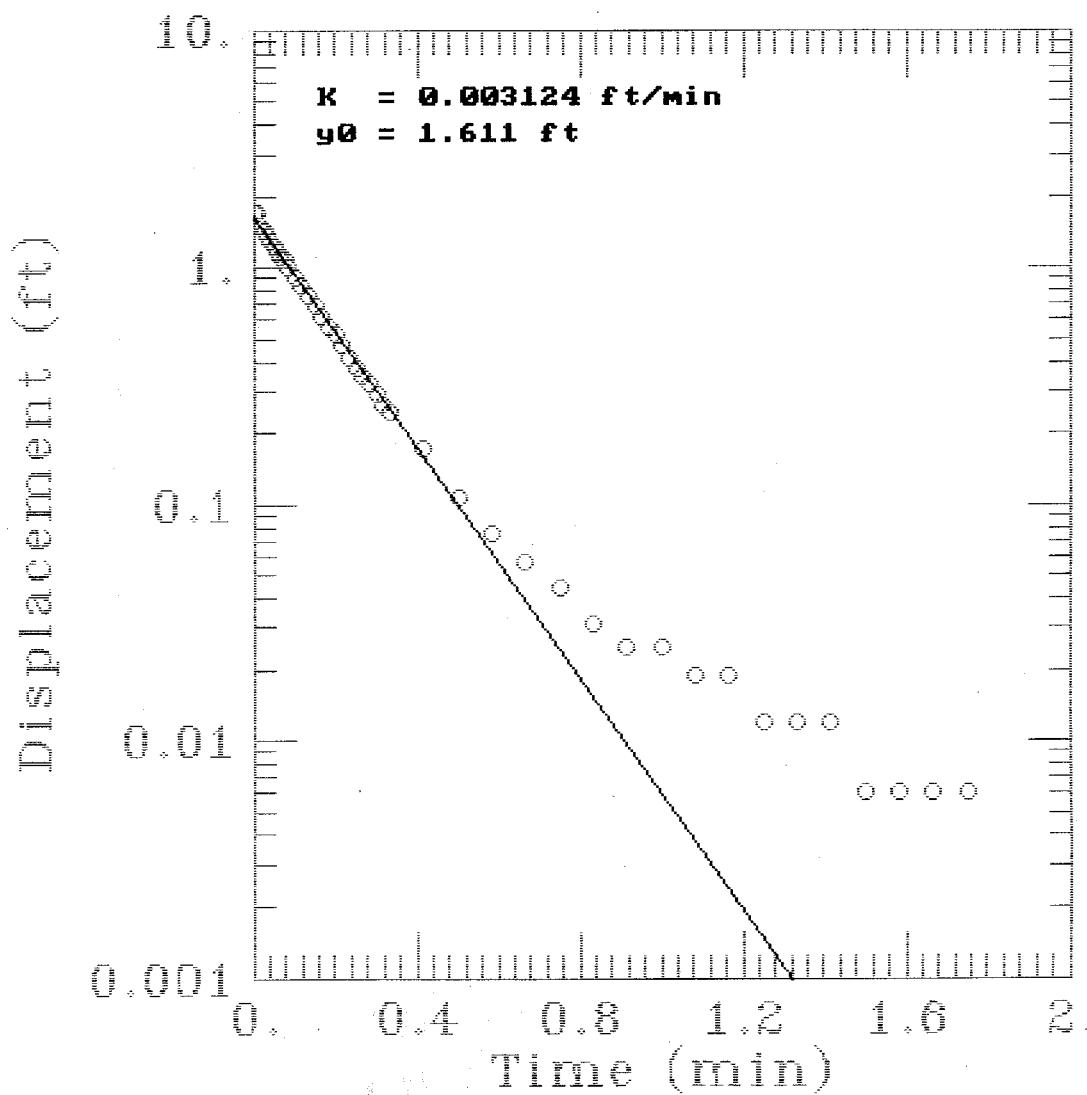
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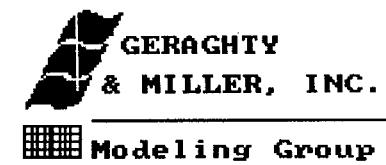
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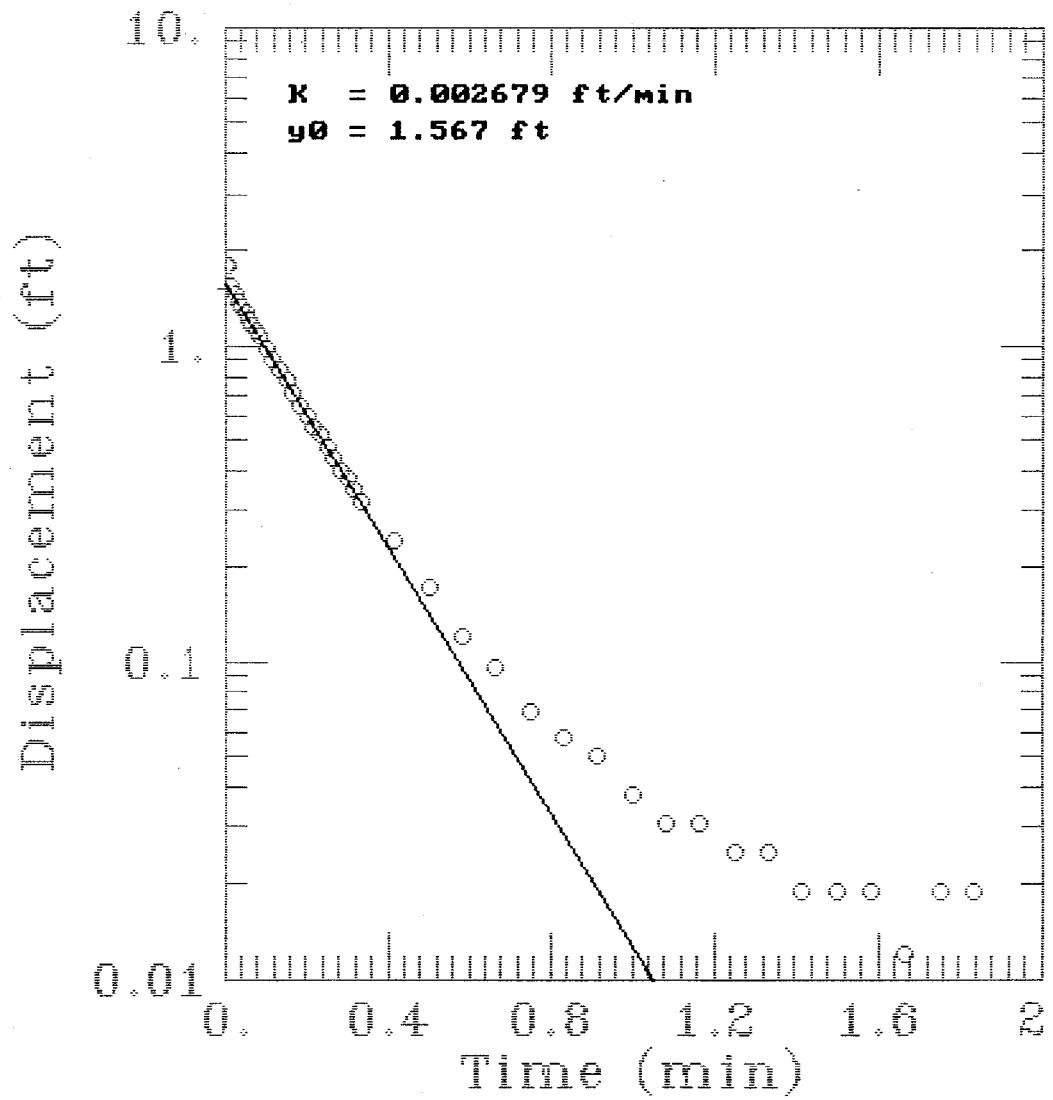
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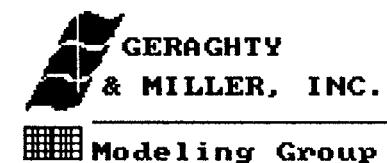
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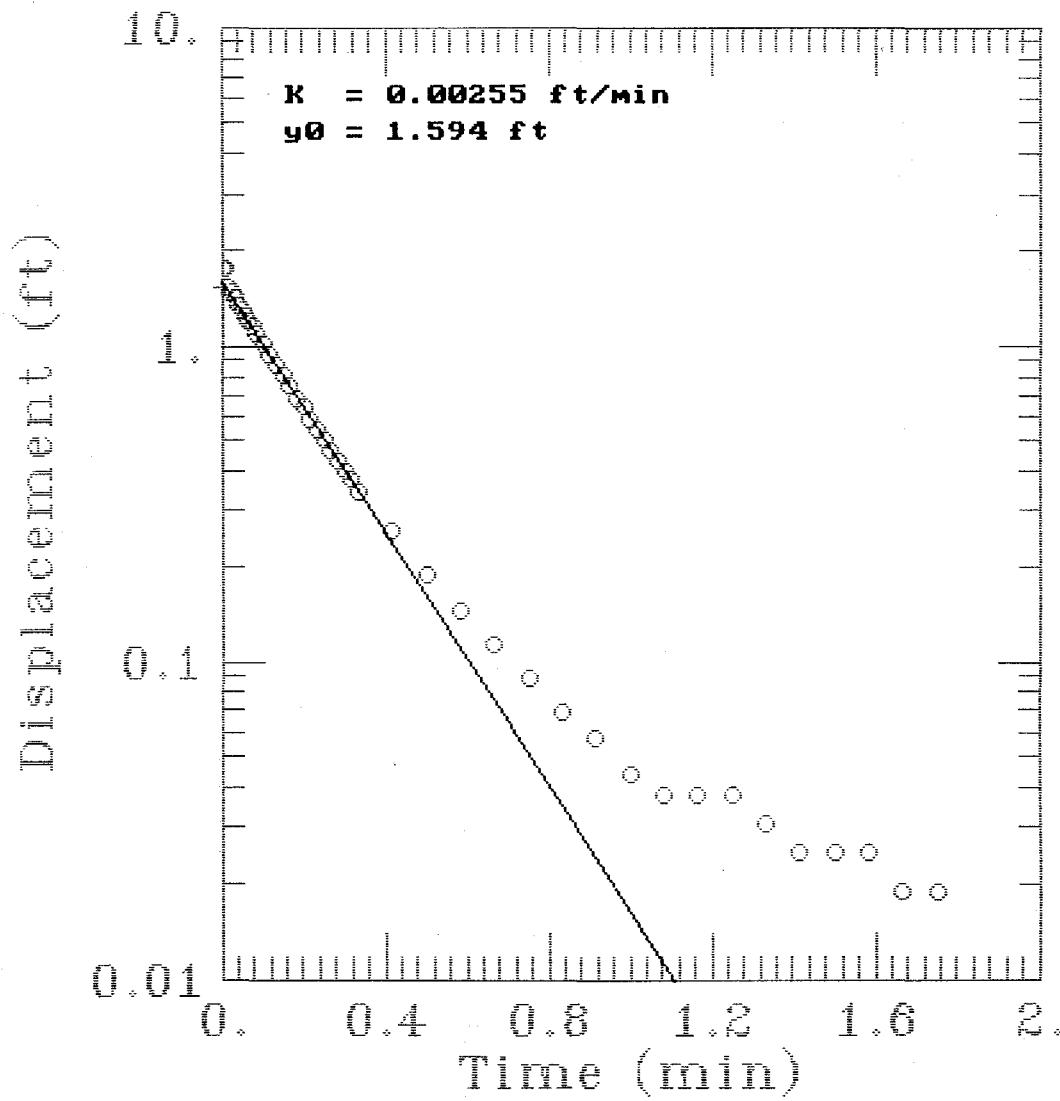
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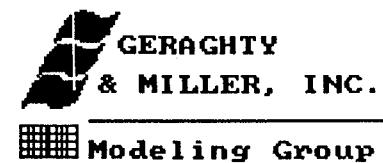
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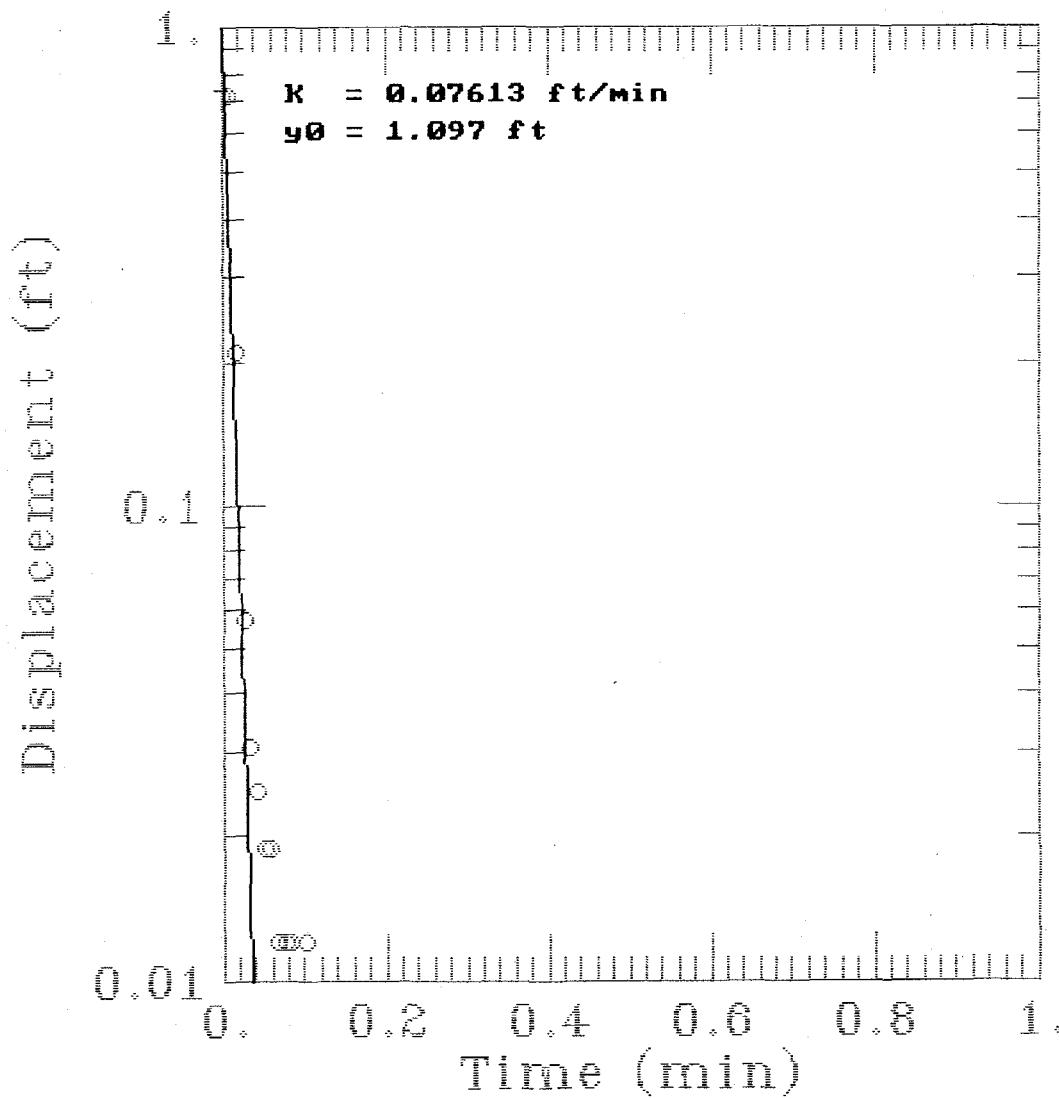


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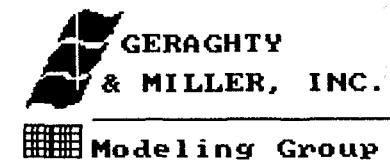


Modeling Group

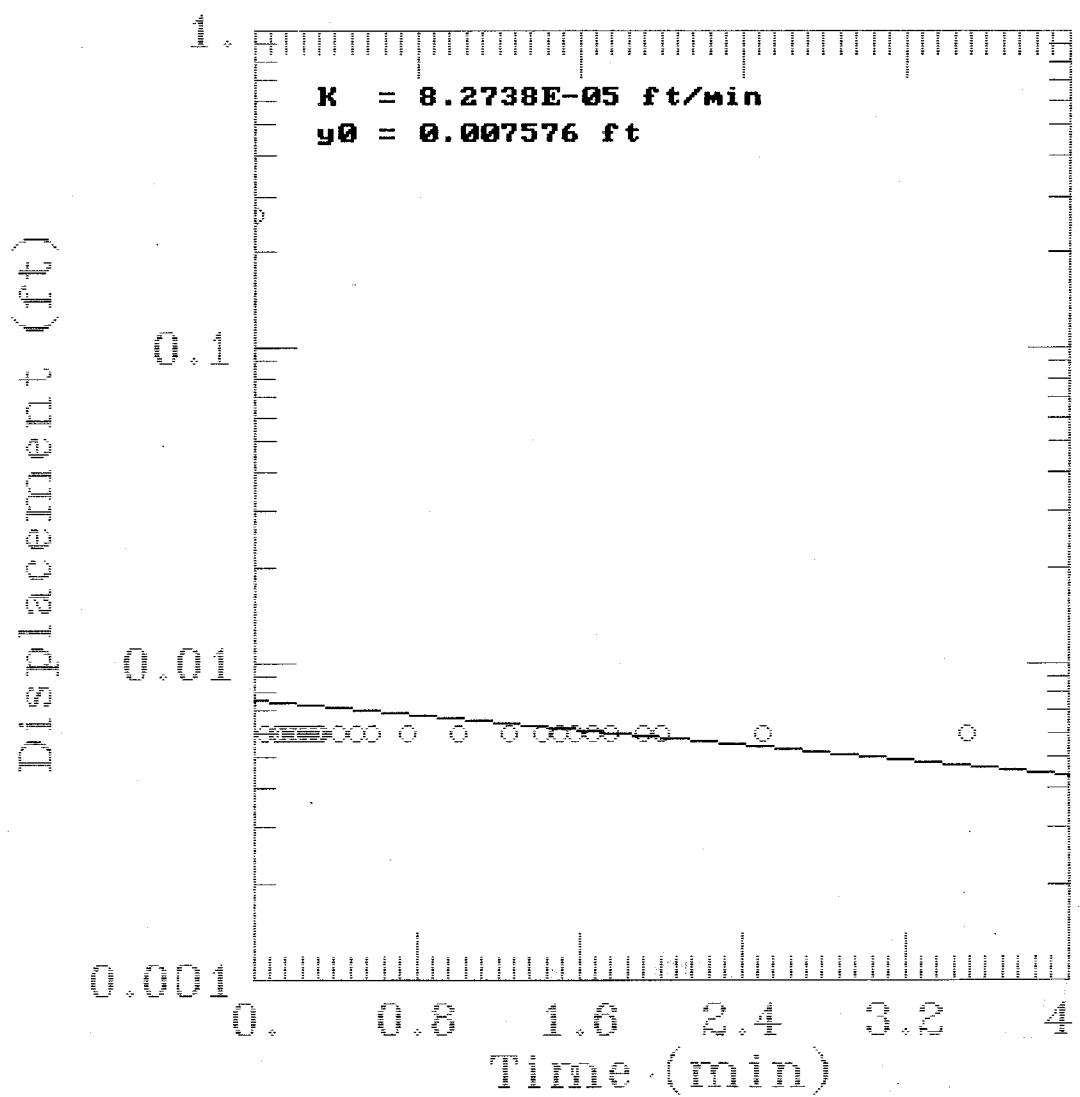
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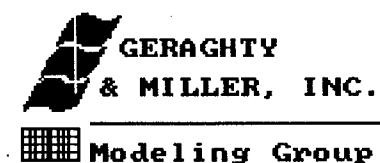
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WHF-18-2 RUN#2

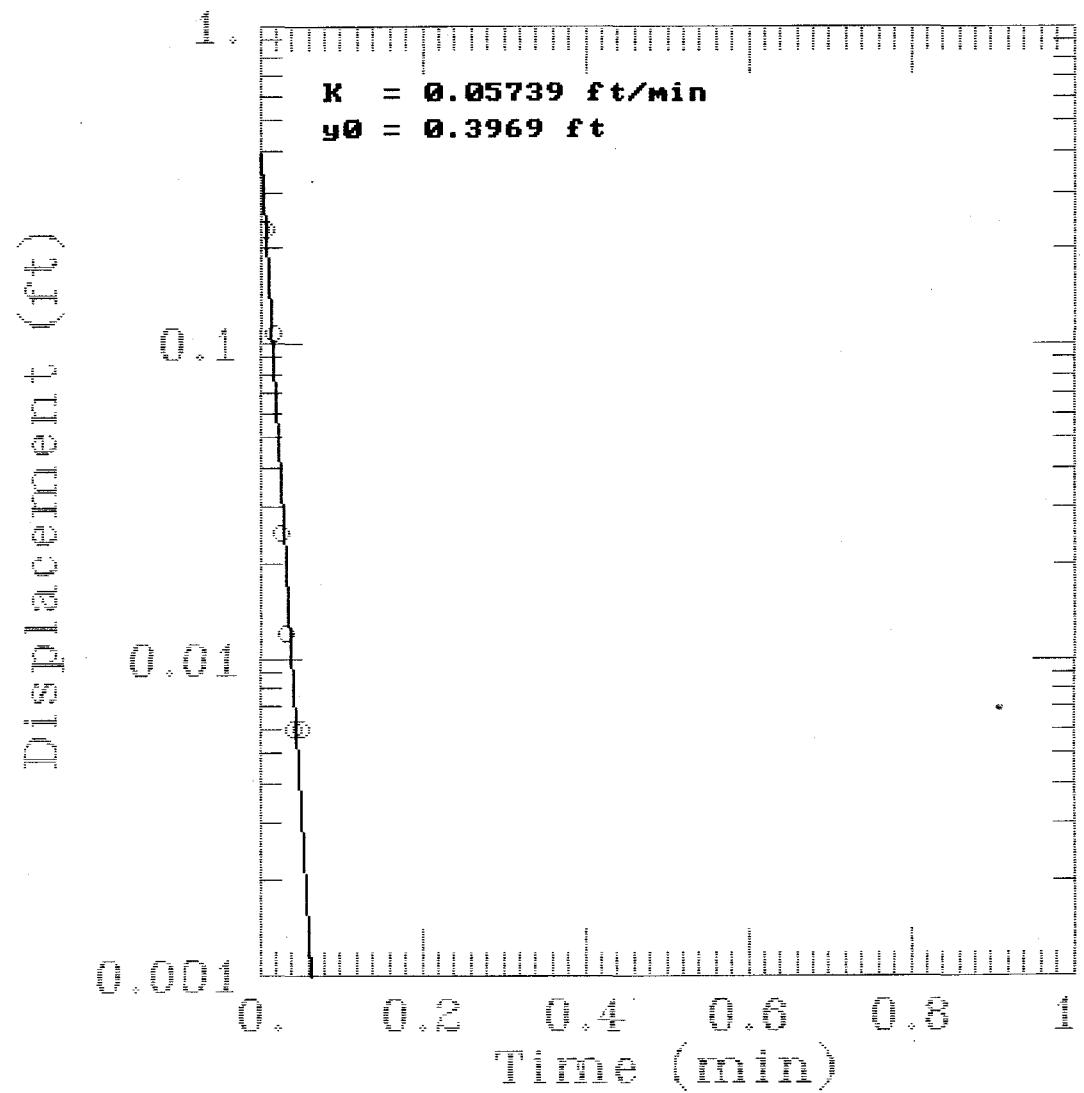


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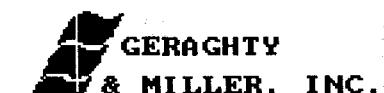


Modeling Group

WHF-18-2 RUN #3

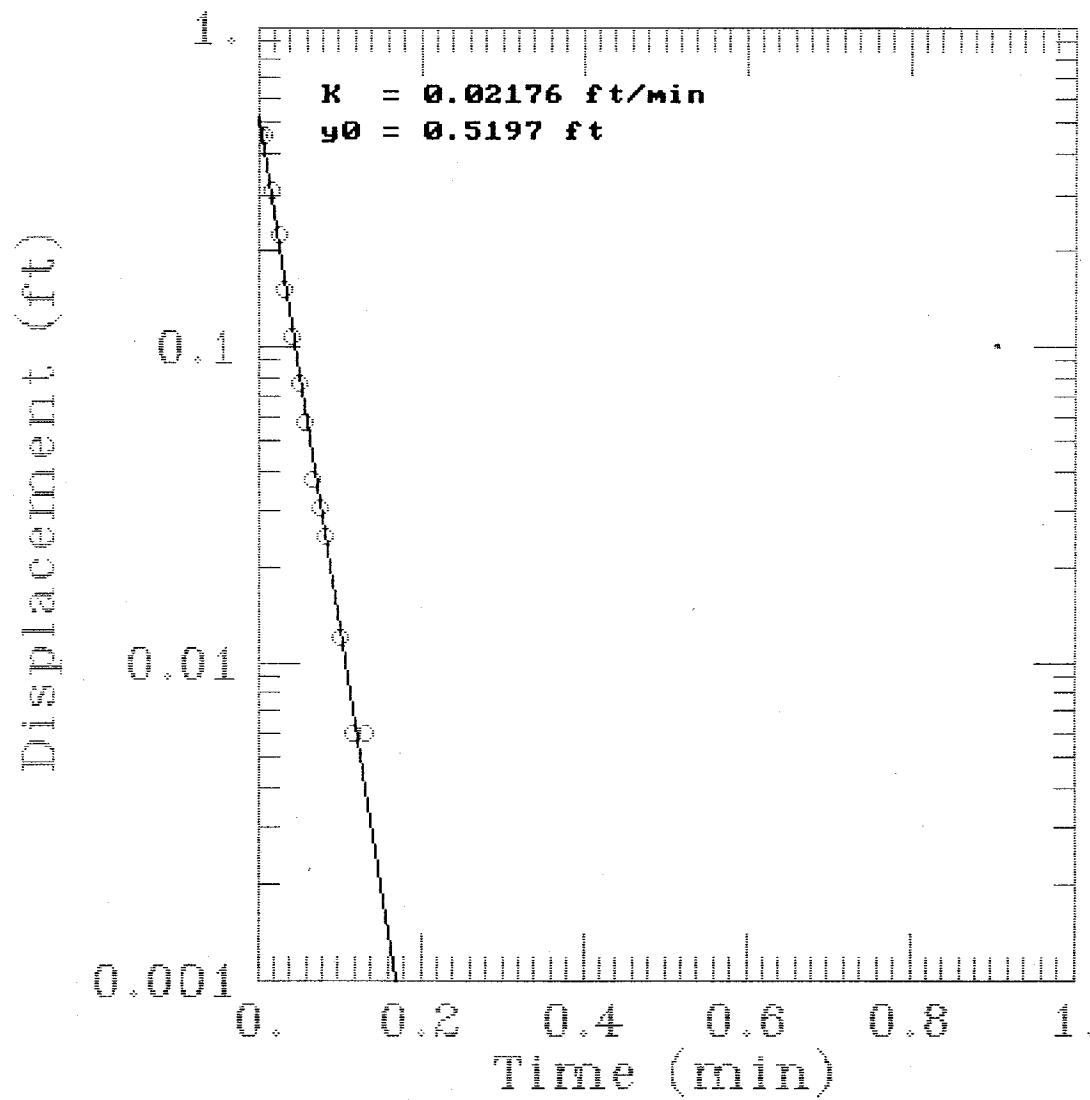


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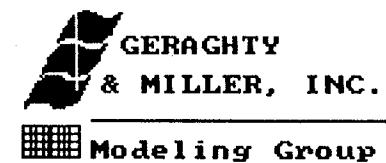


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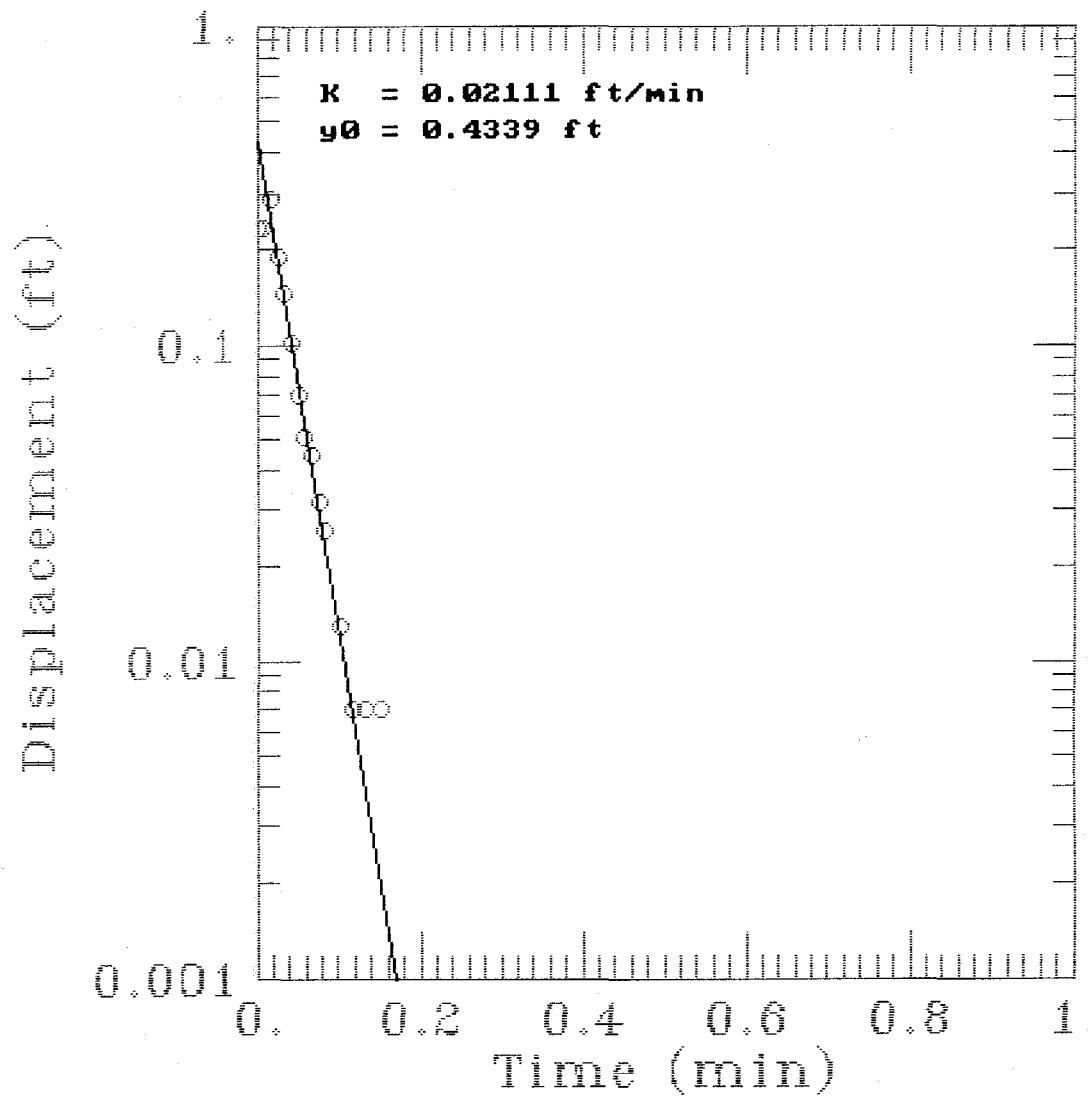
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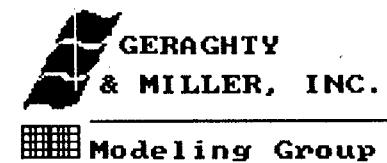
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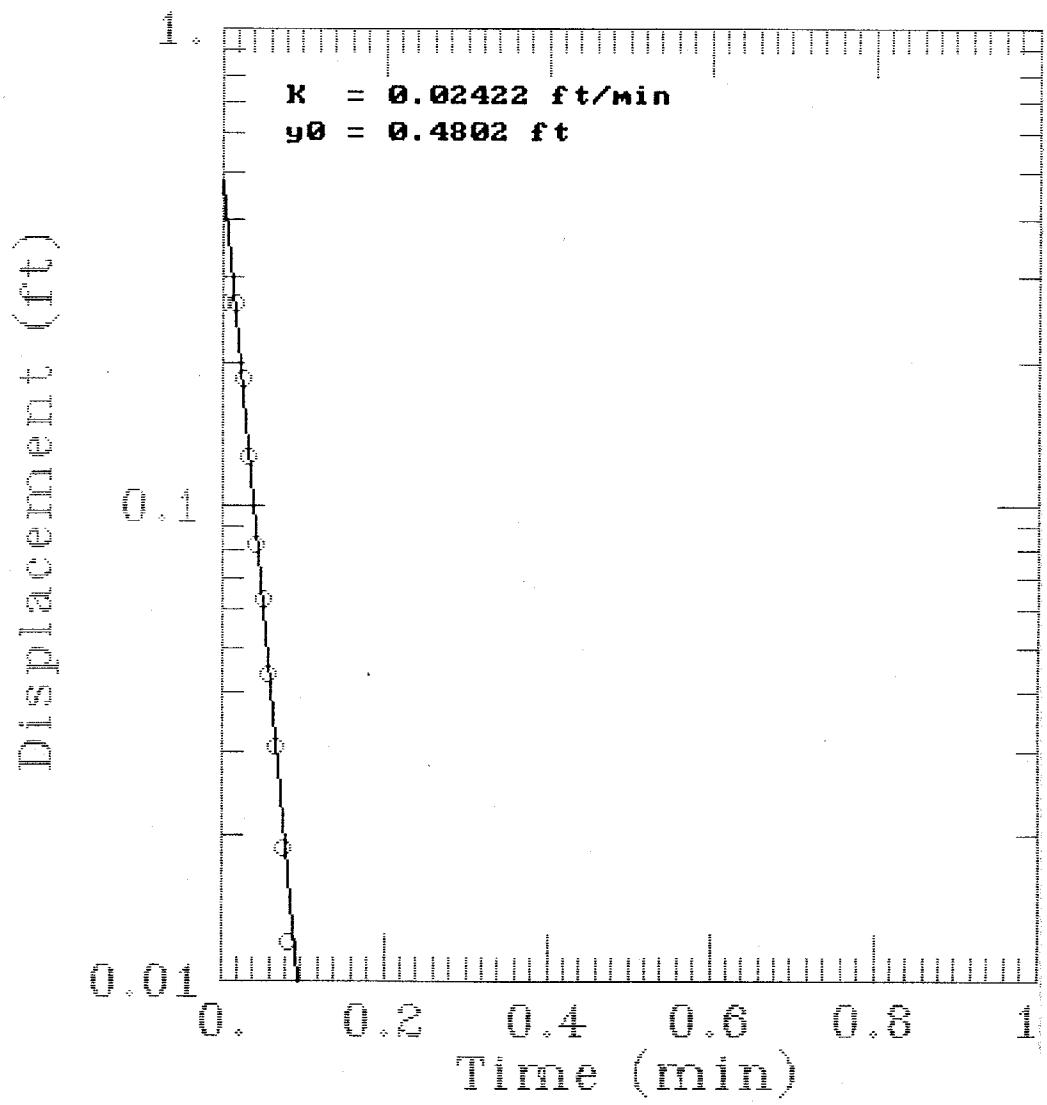
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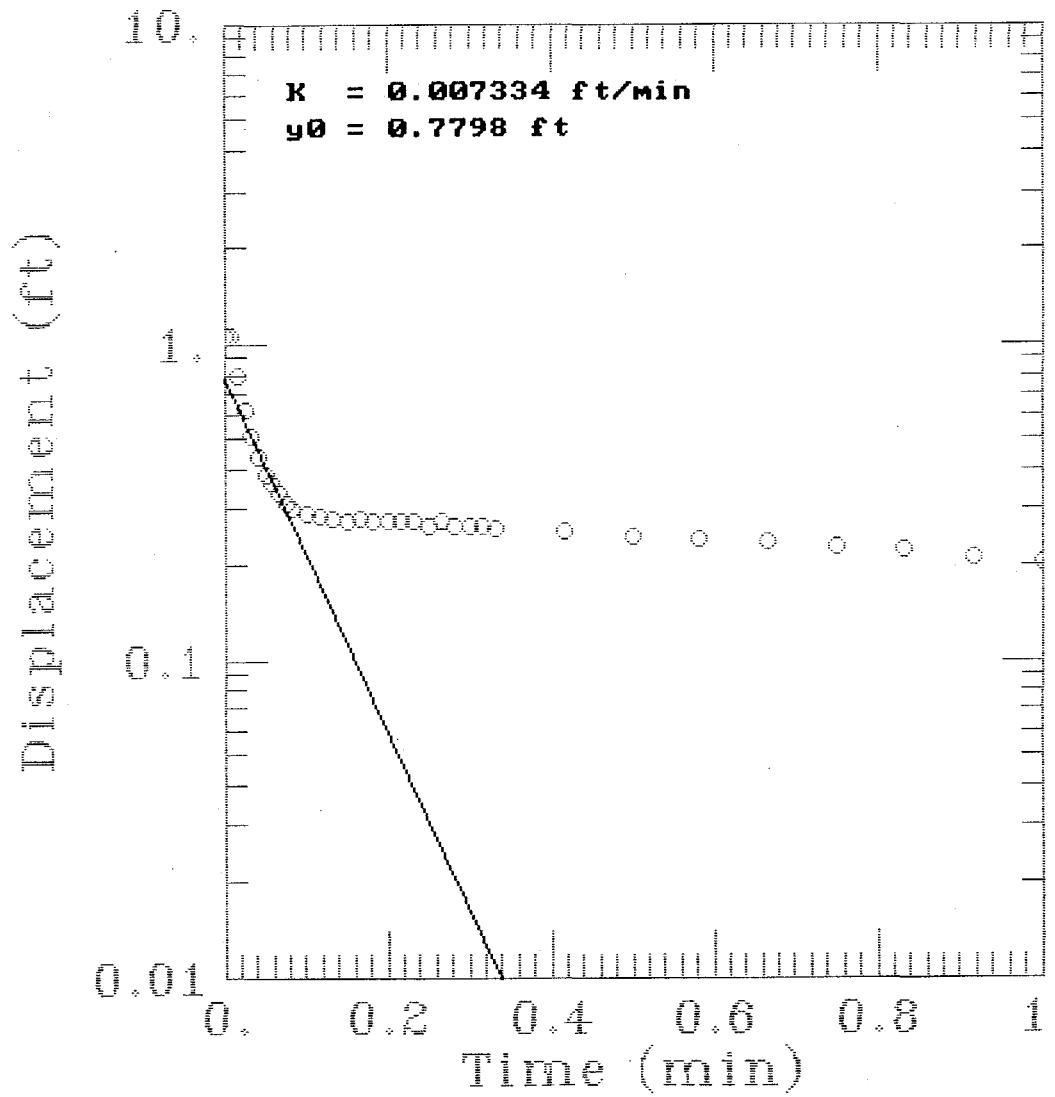


WHF-29-1 RUN #3

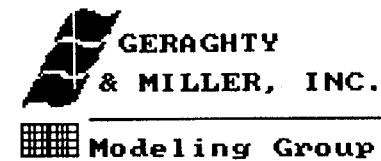


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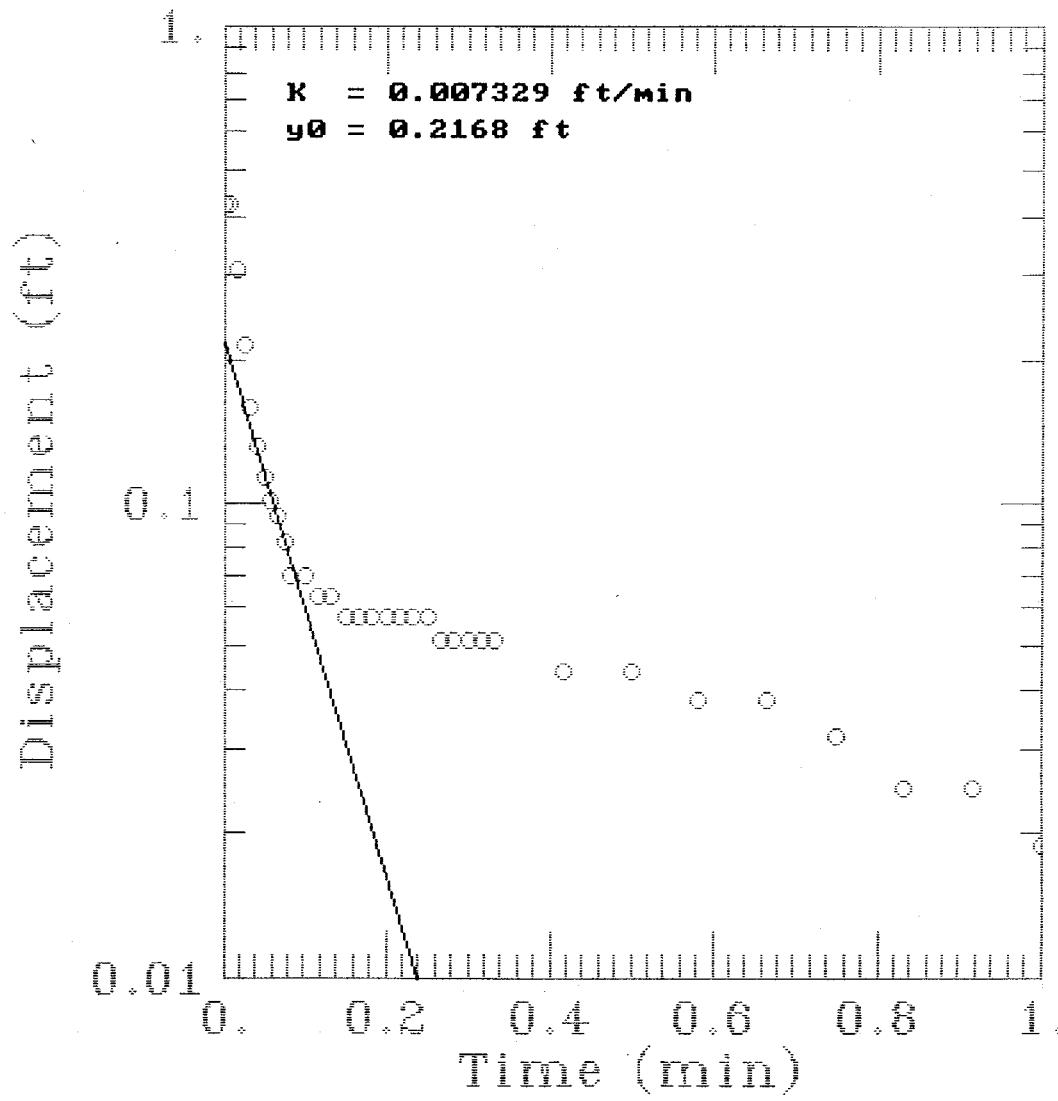
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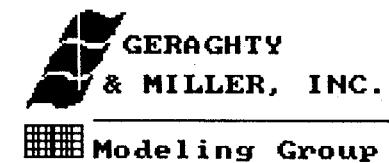
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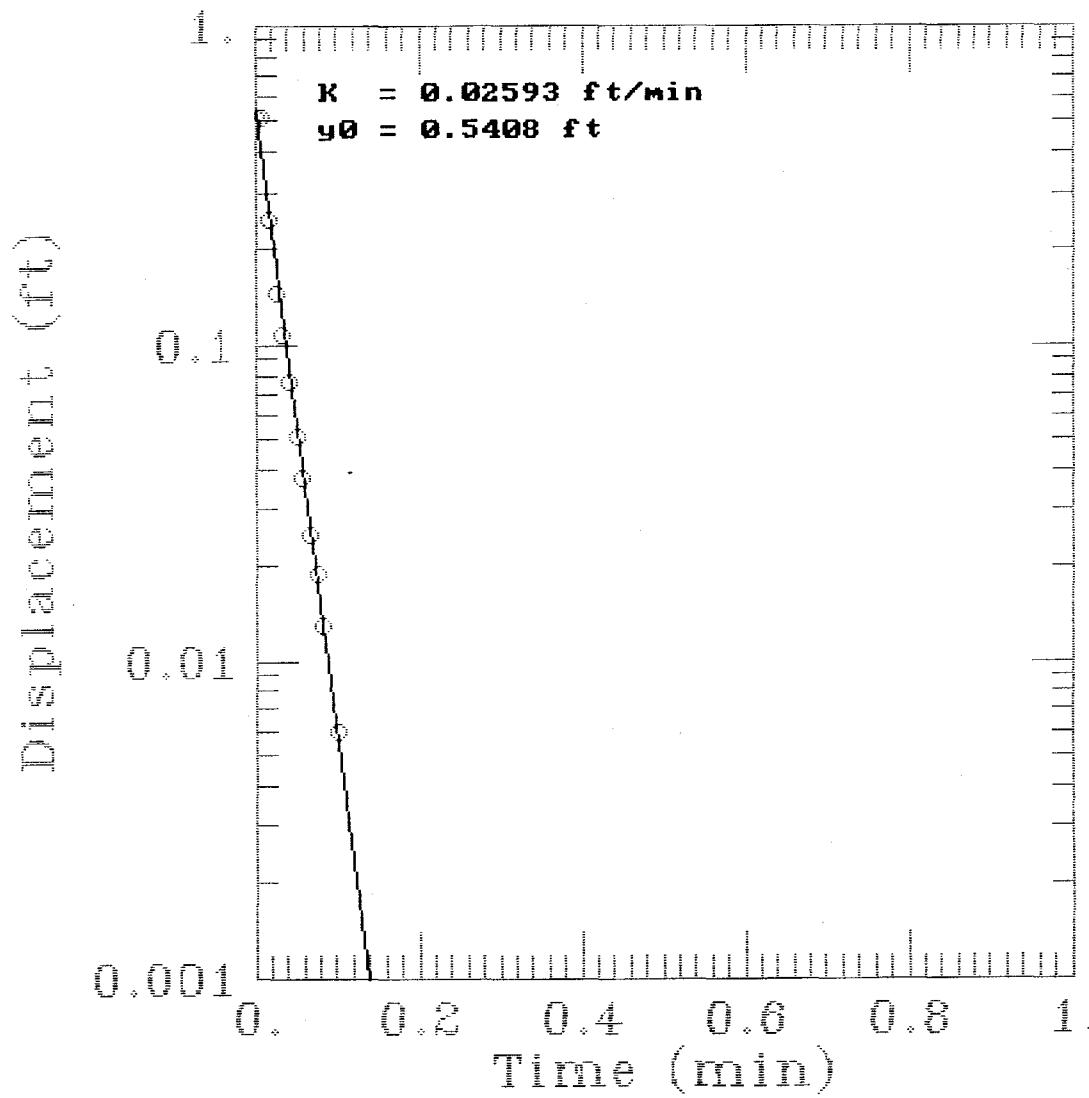
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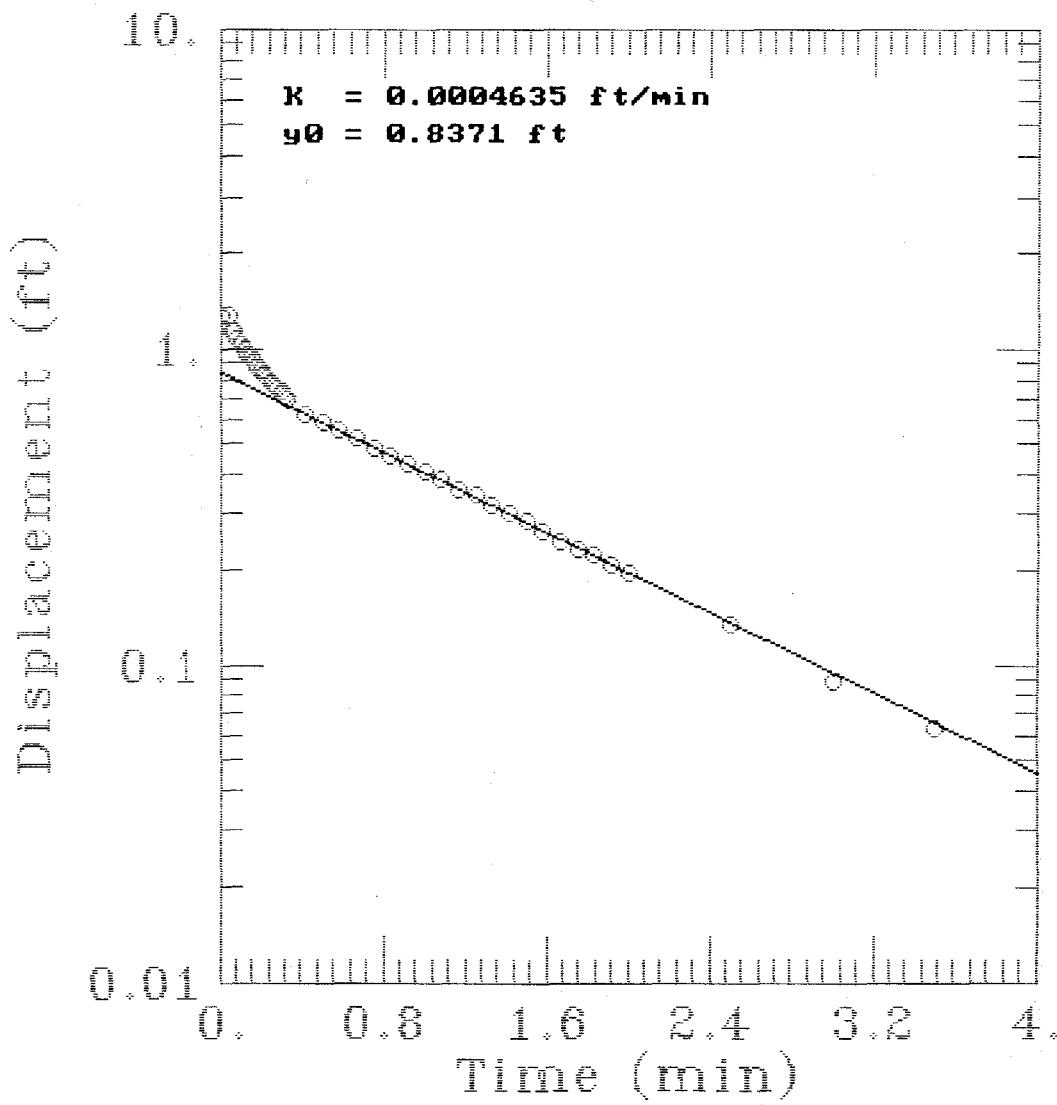


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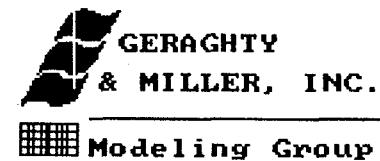


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Modeling Group

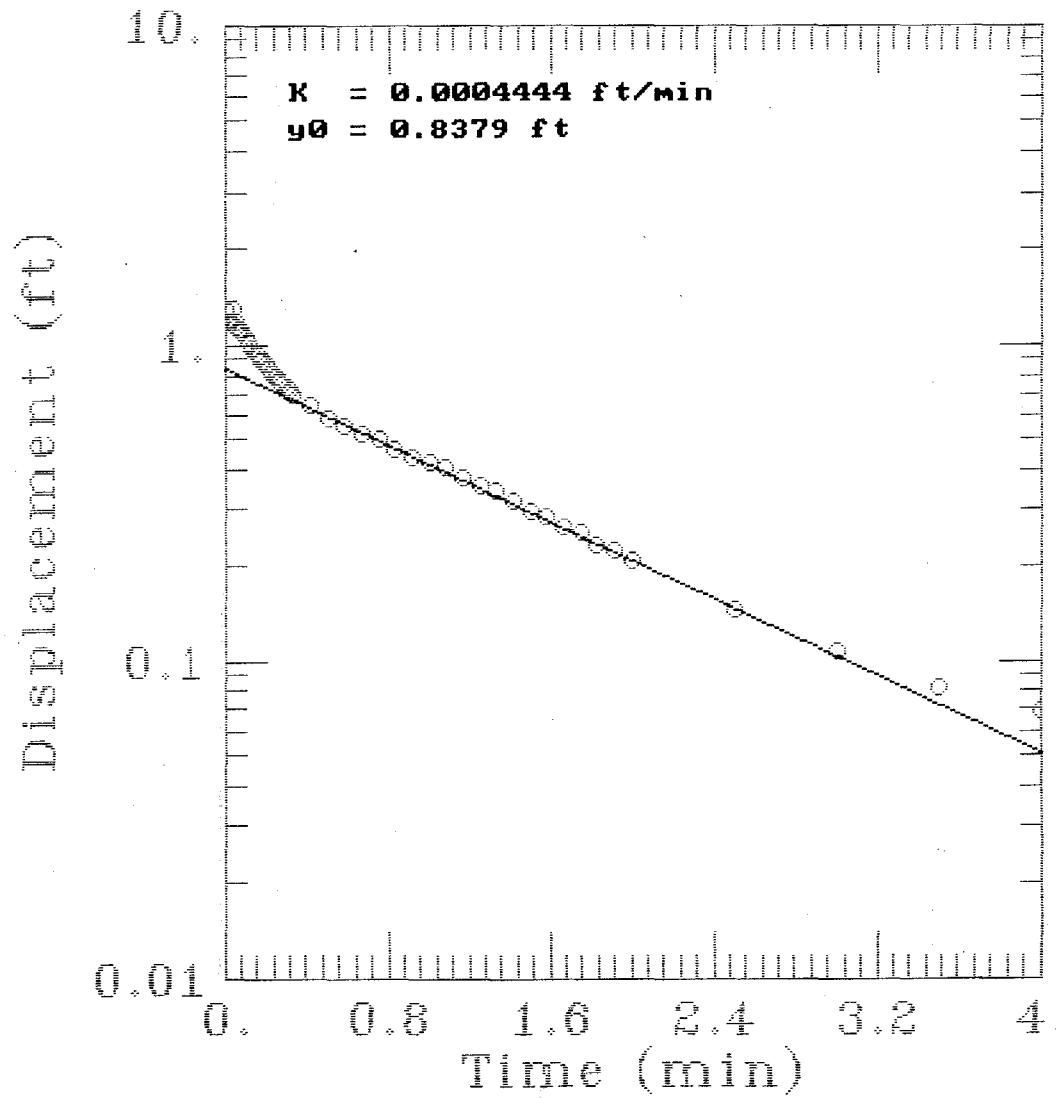
WHF-30-3 RUN #1



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WHF-30-3 RUN #2

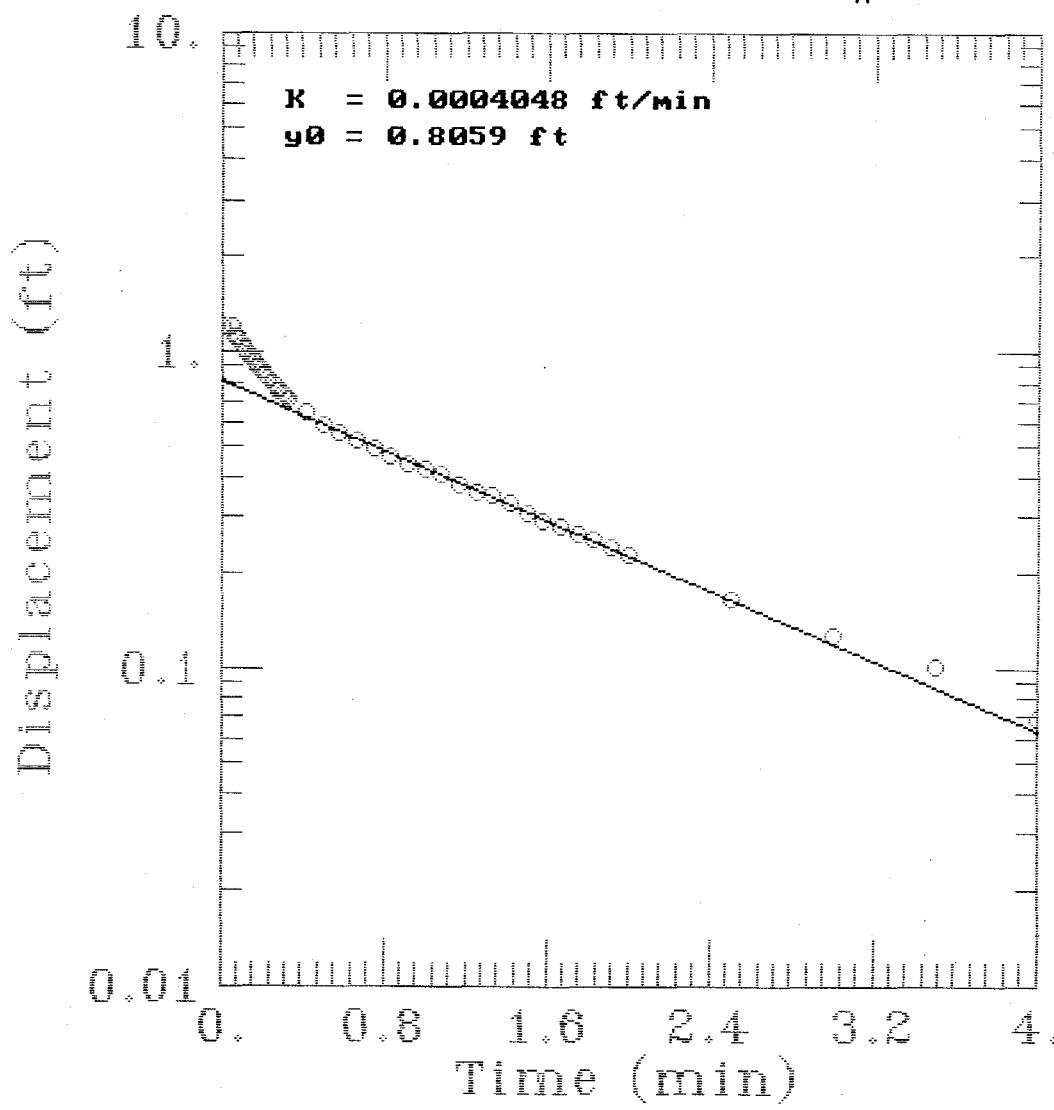


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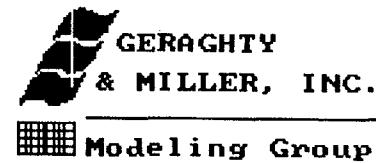


Modeling Group

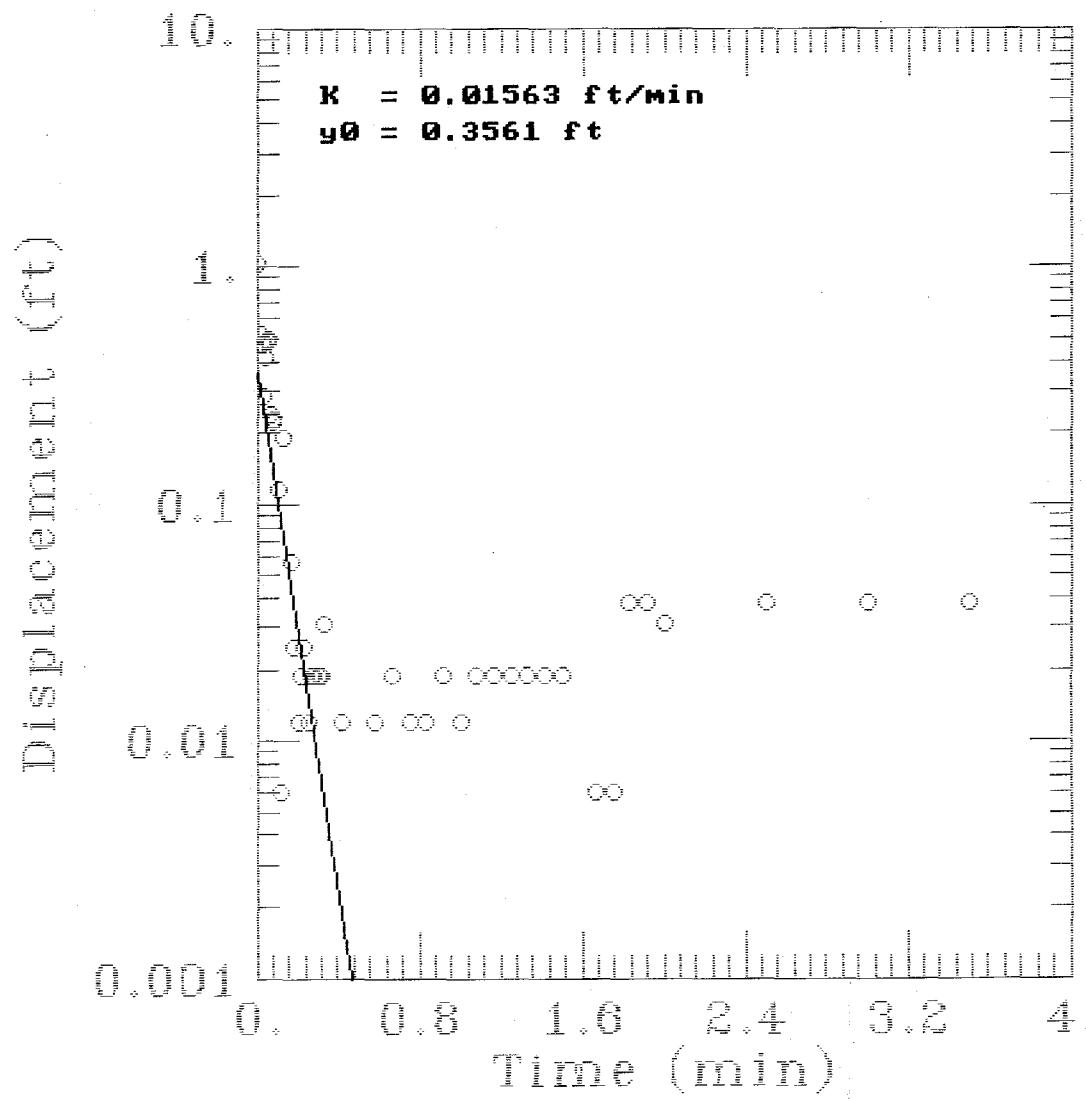
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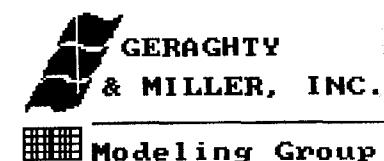
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WHF-30-5 RUN #1



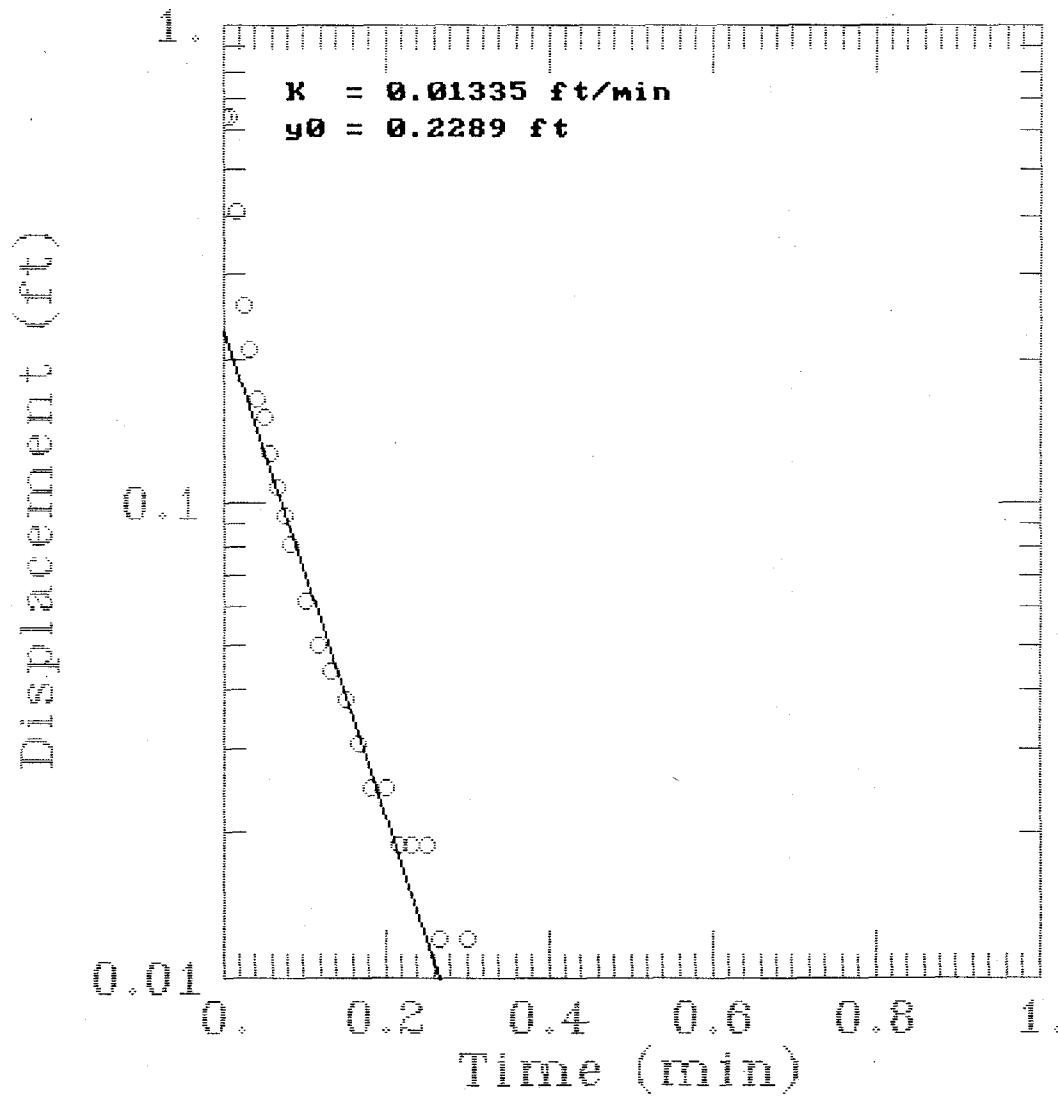
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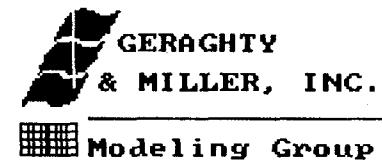
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Modeling Group

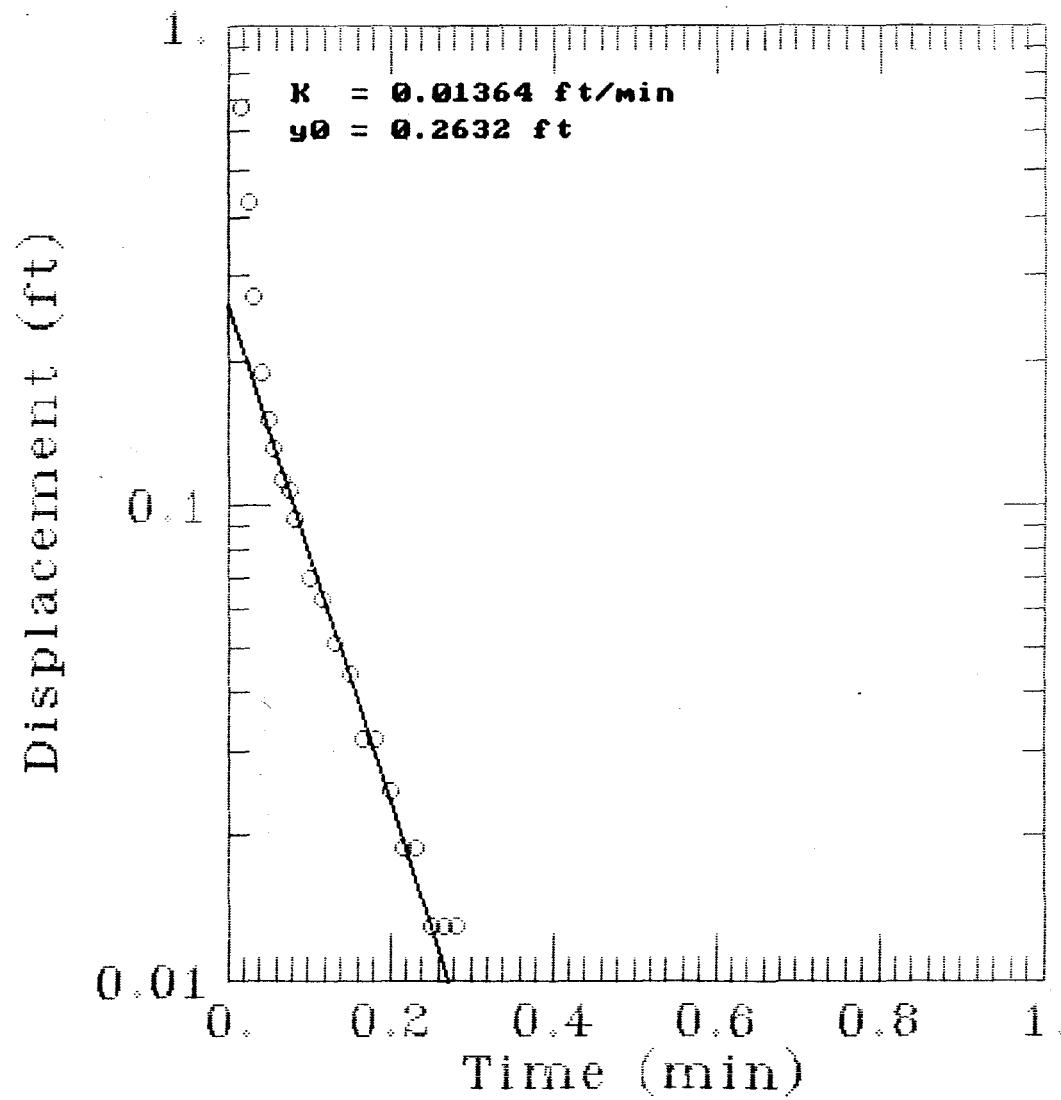
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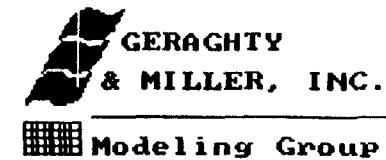
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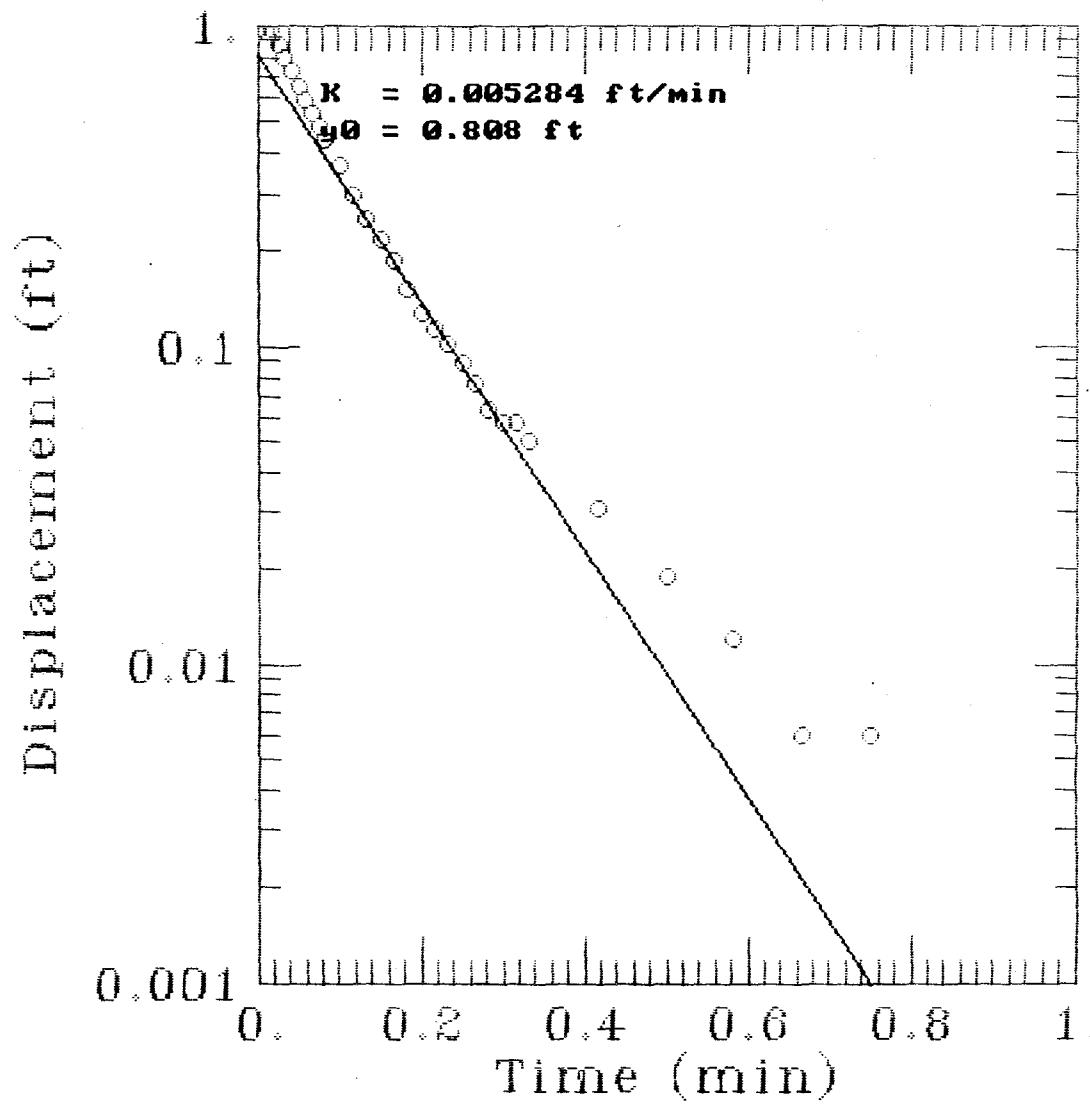
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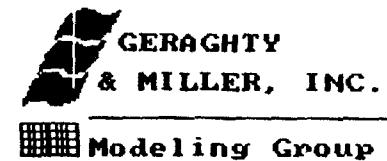
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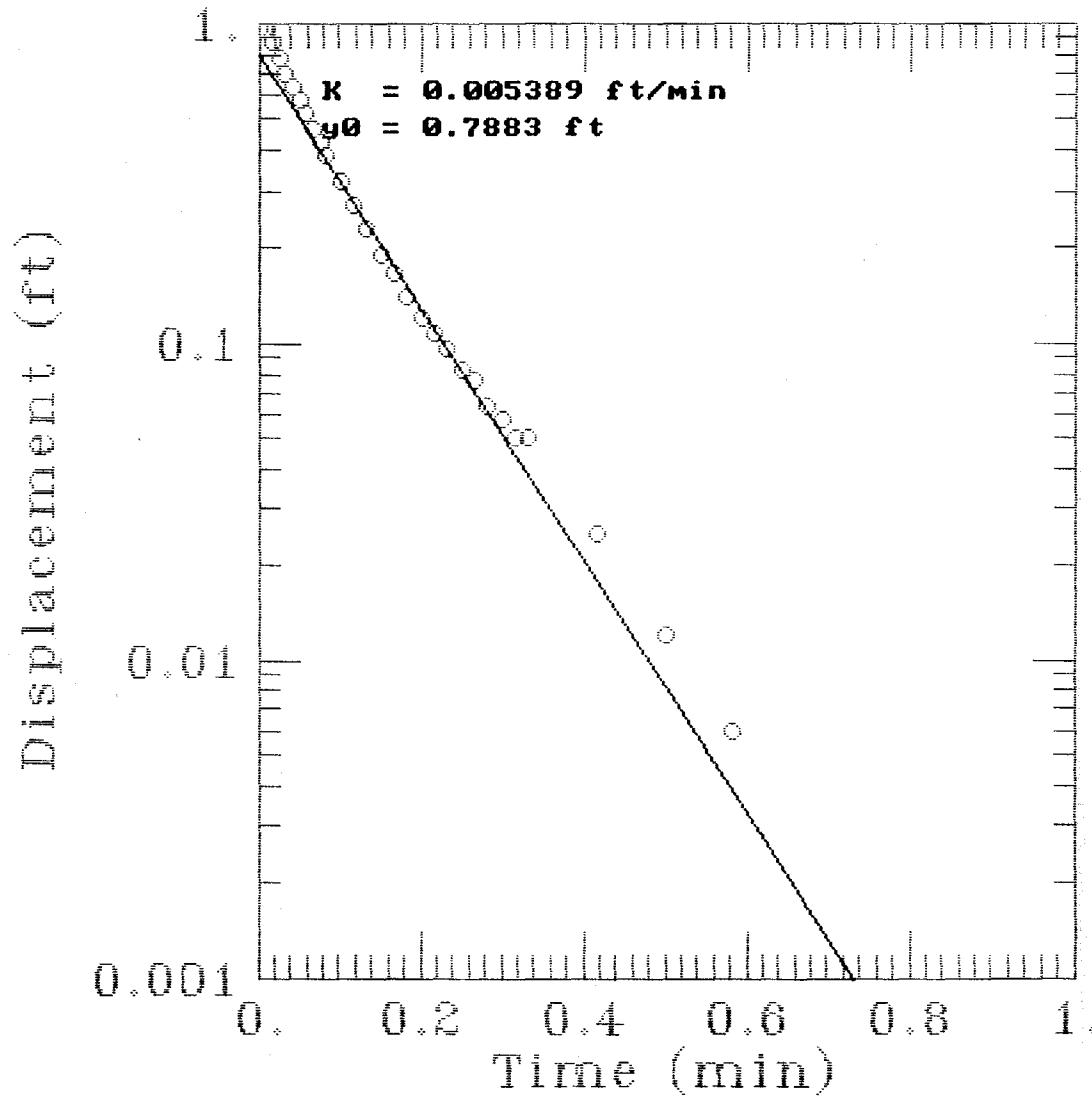
WHF-32-5 RUN #1



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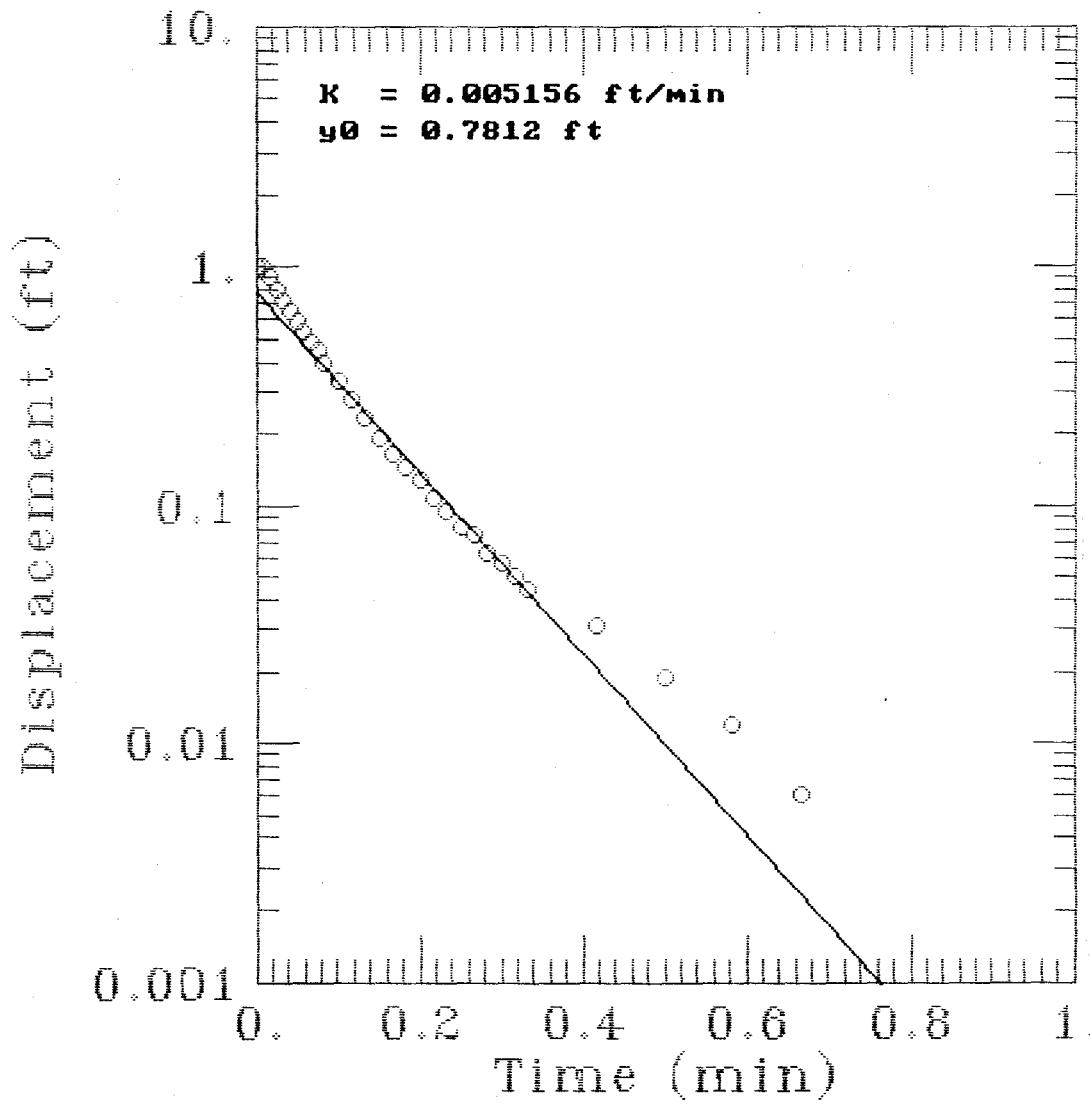


WHF-32-5 RUN #2

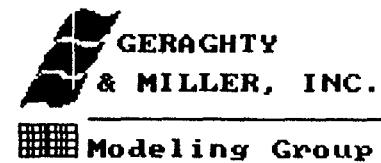


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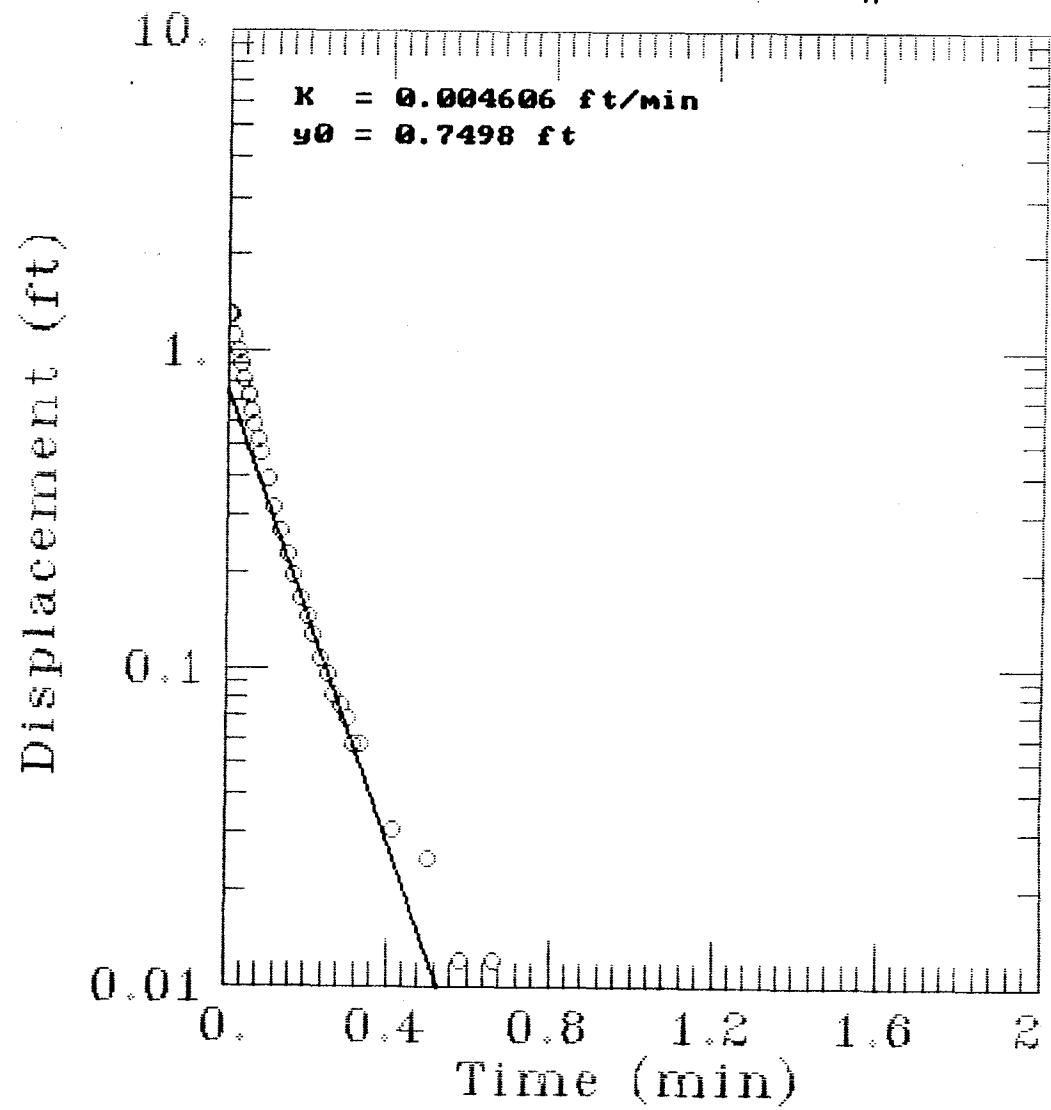
WHF-32-5 RUN #3



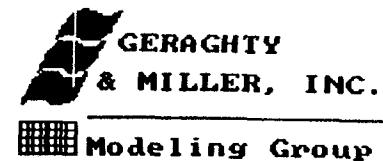
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WHF-33-3 RUN #1



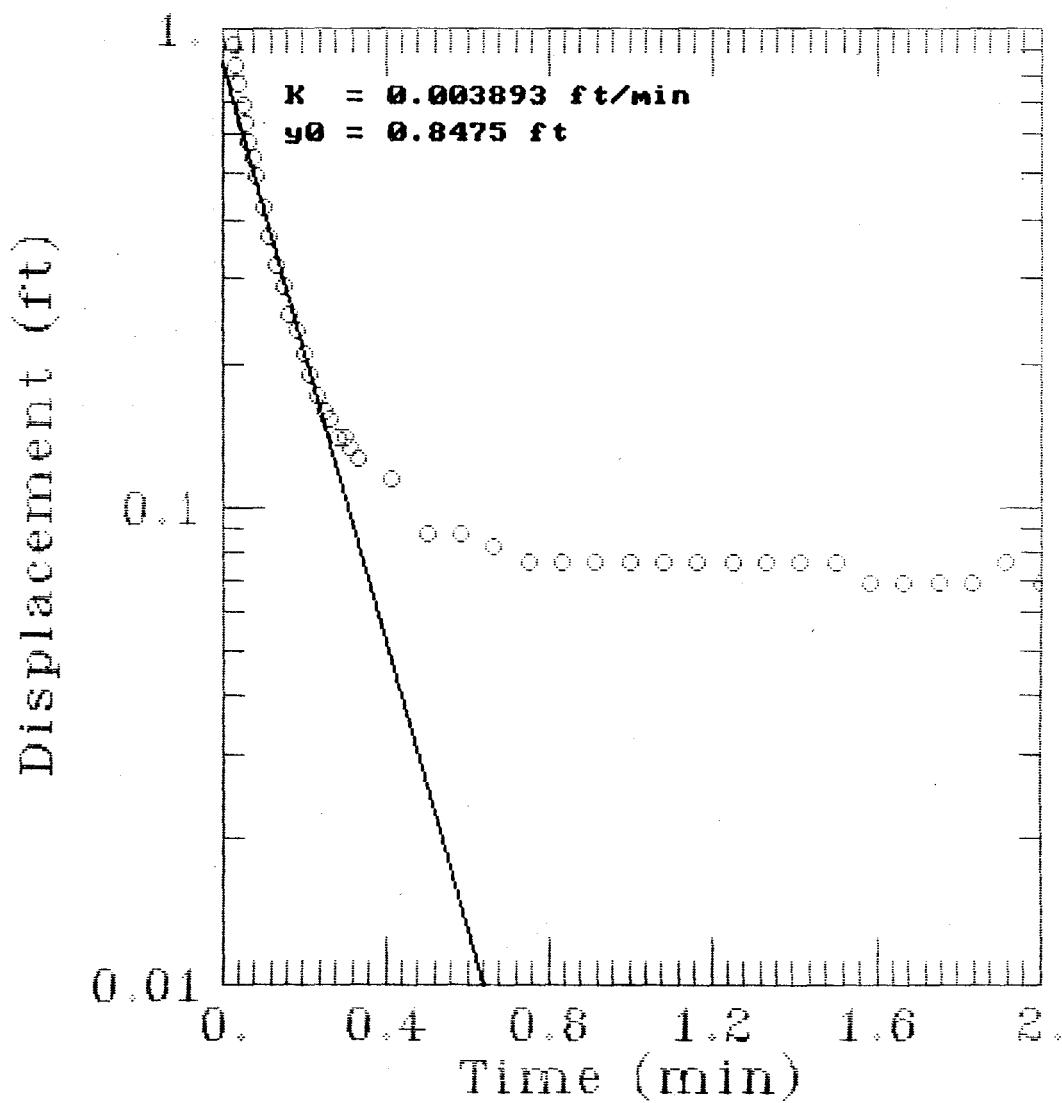
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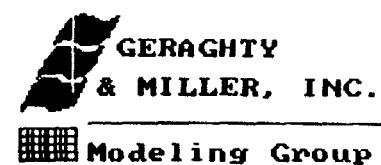
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& MILLER, INC.

Modeling Group

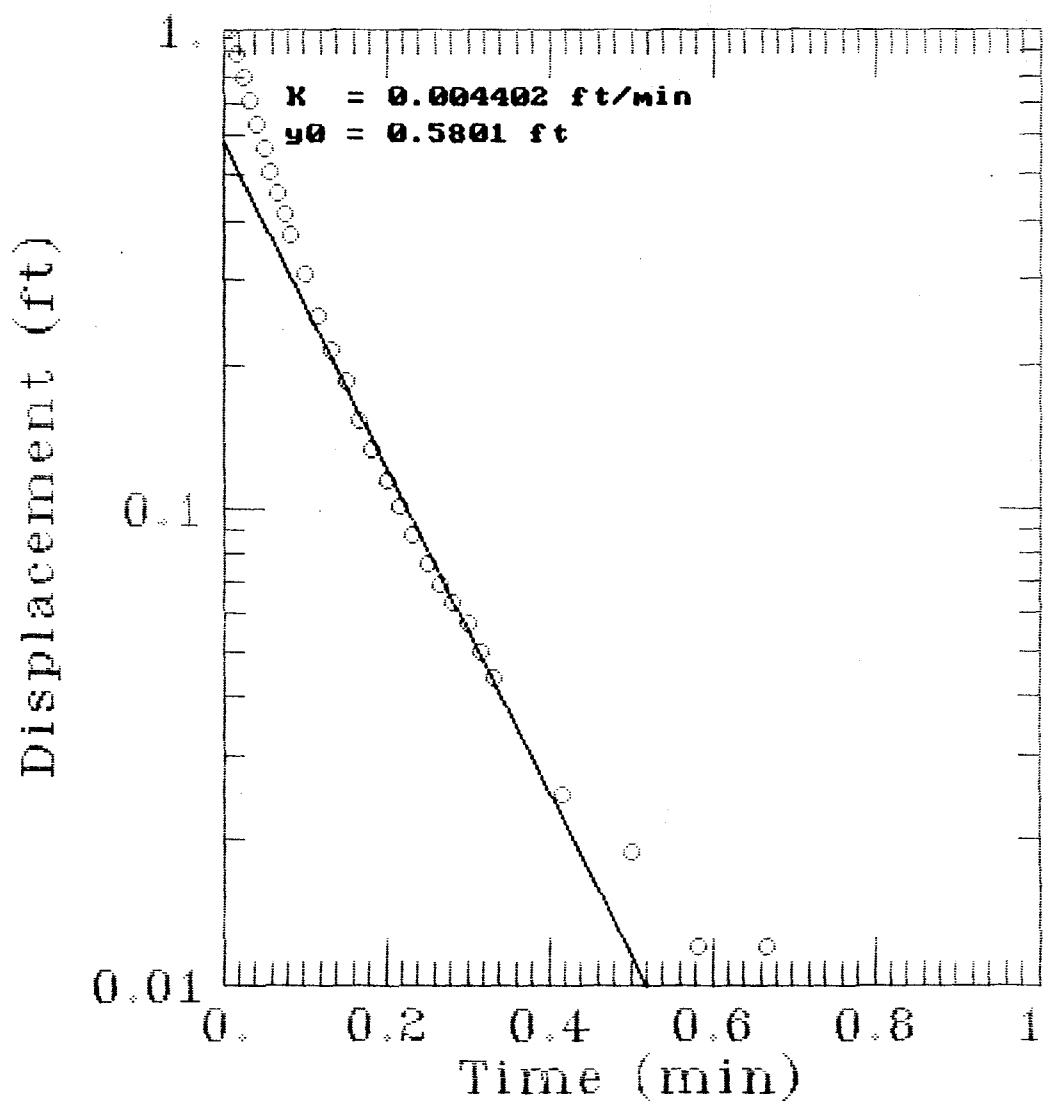
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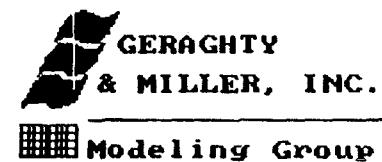
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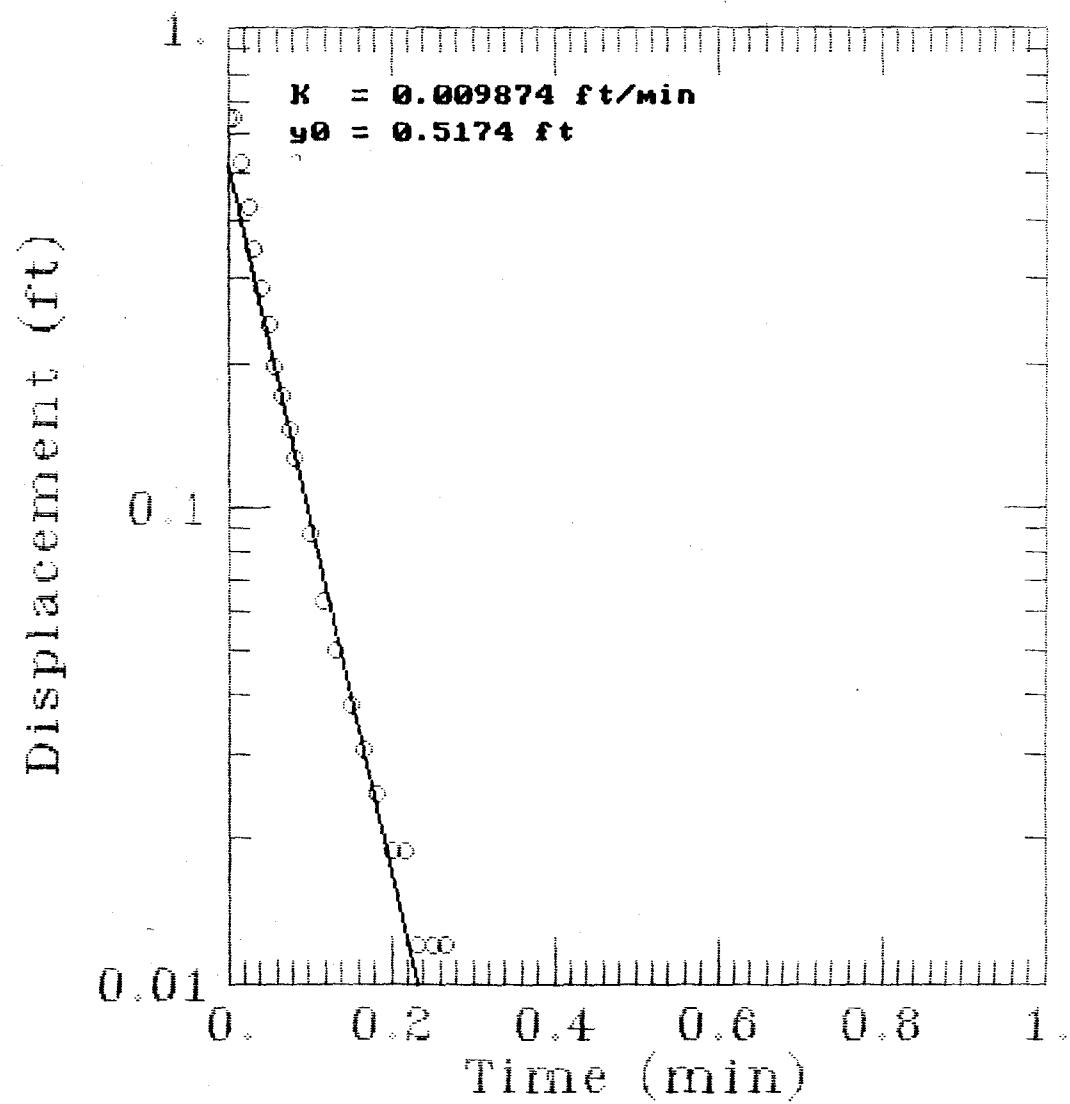
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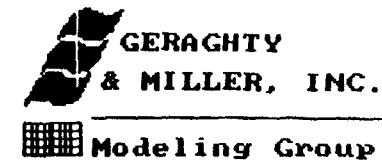
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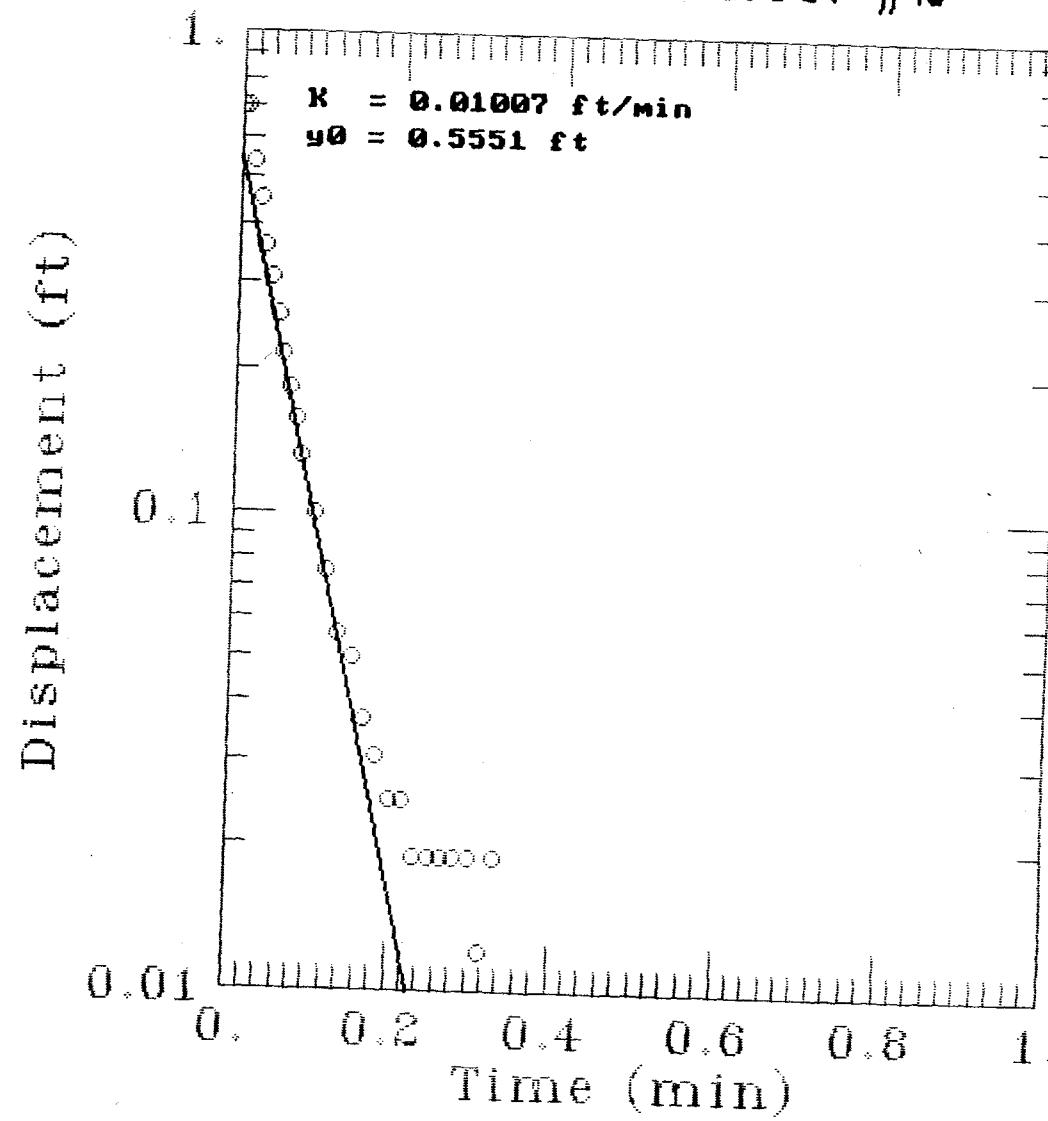
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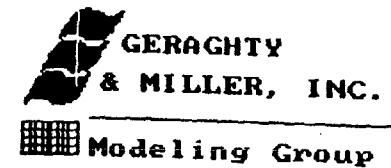
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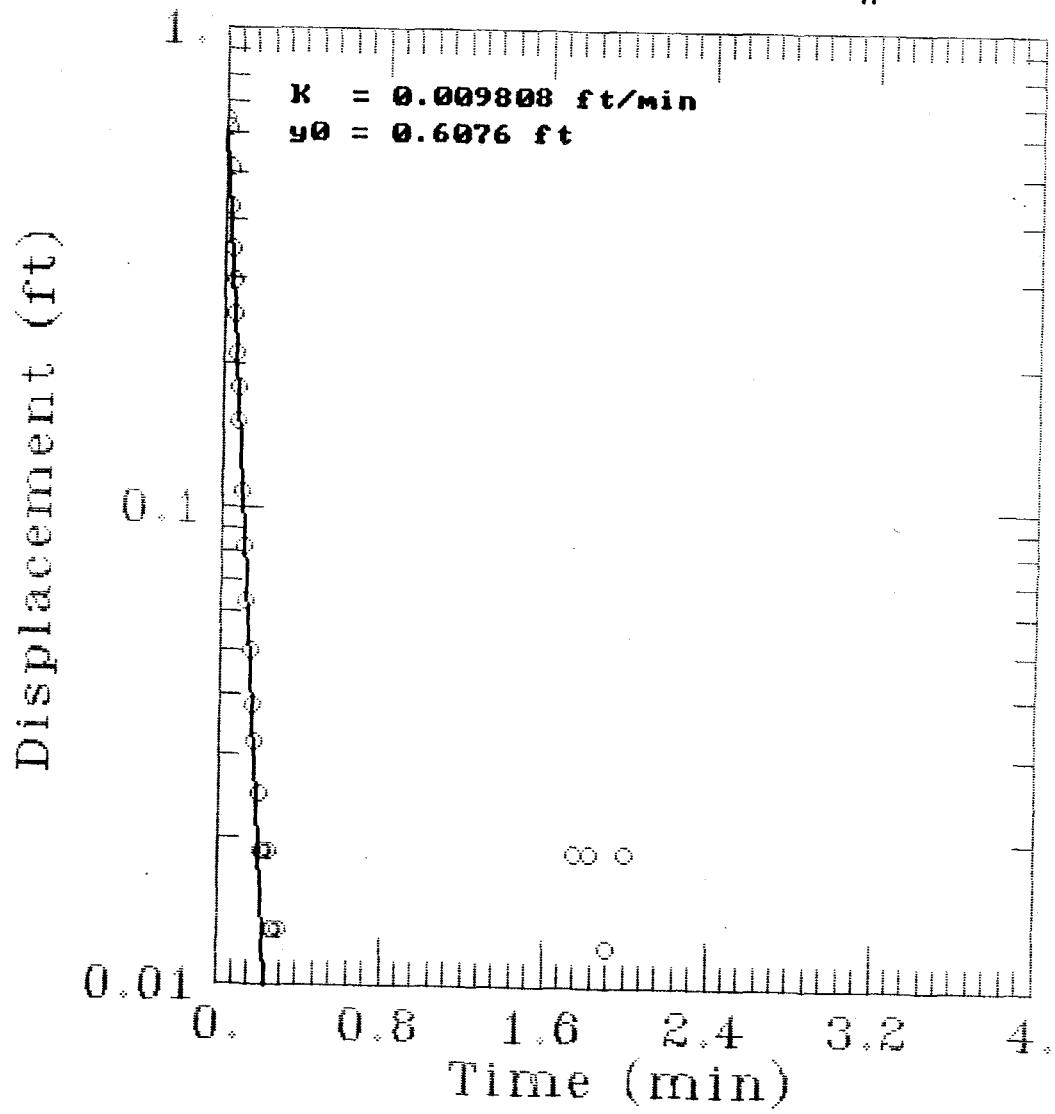
WHF-33-5 RUN #2



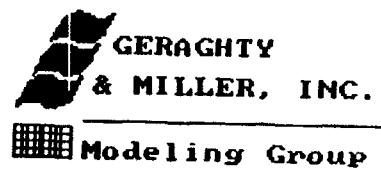
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WHF-33-5 RUN #3

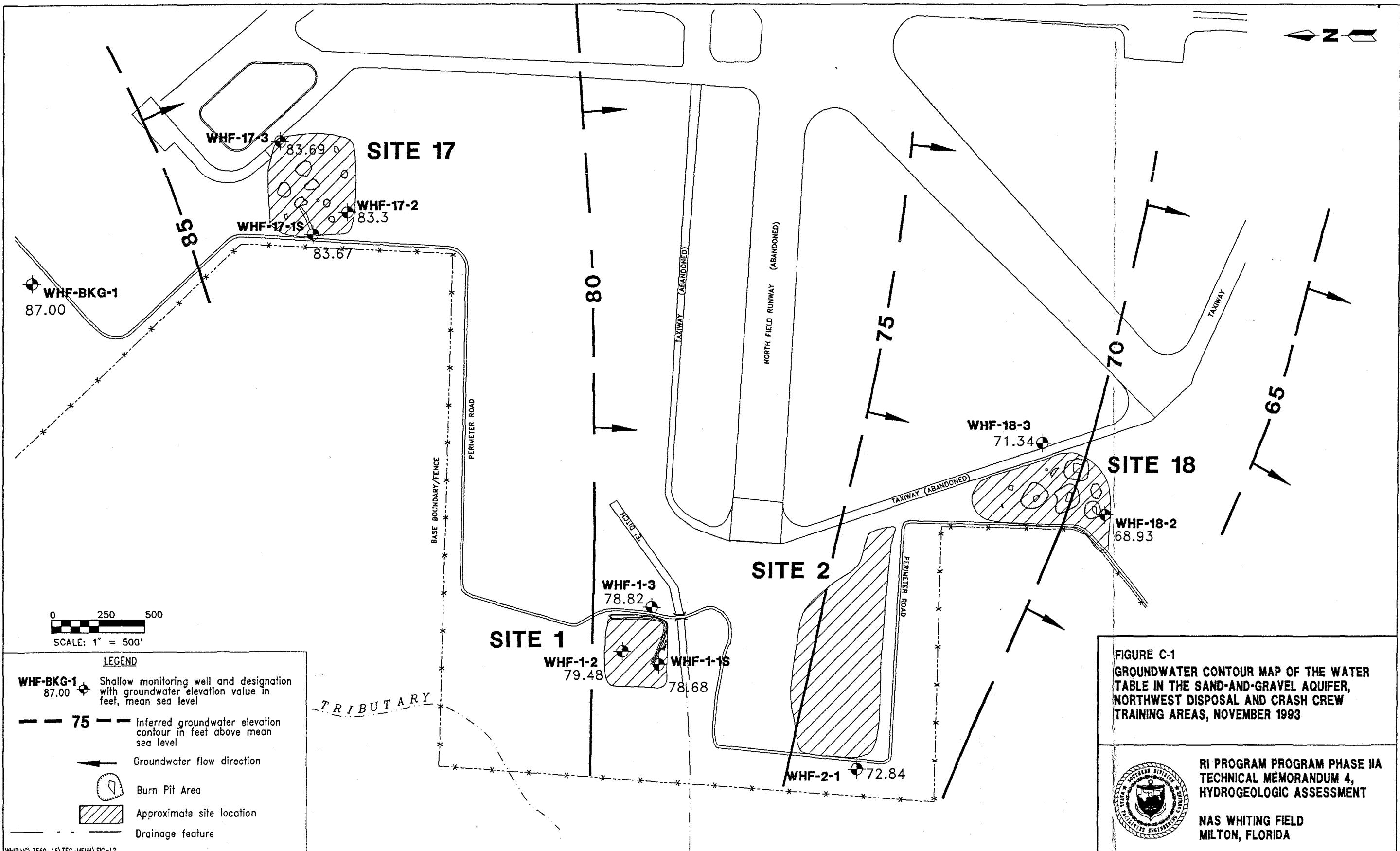


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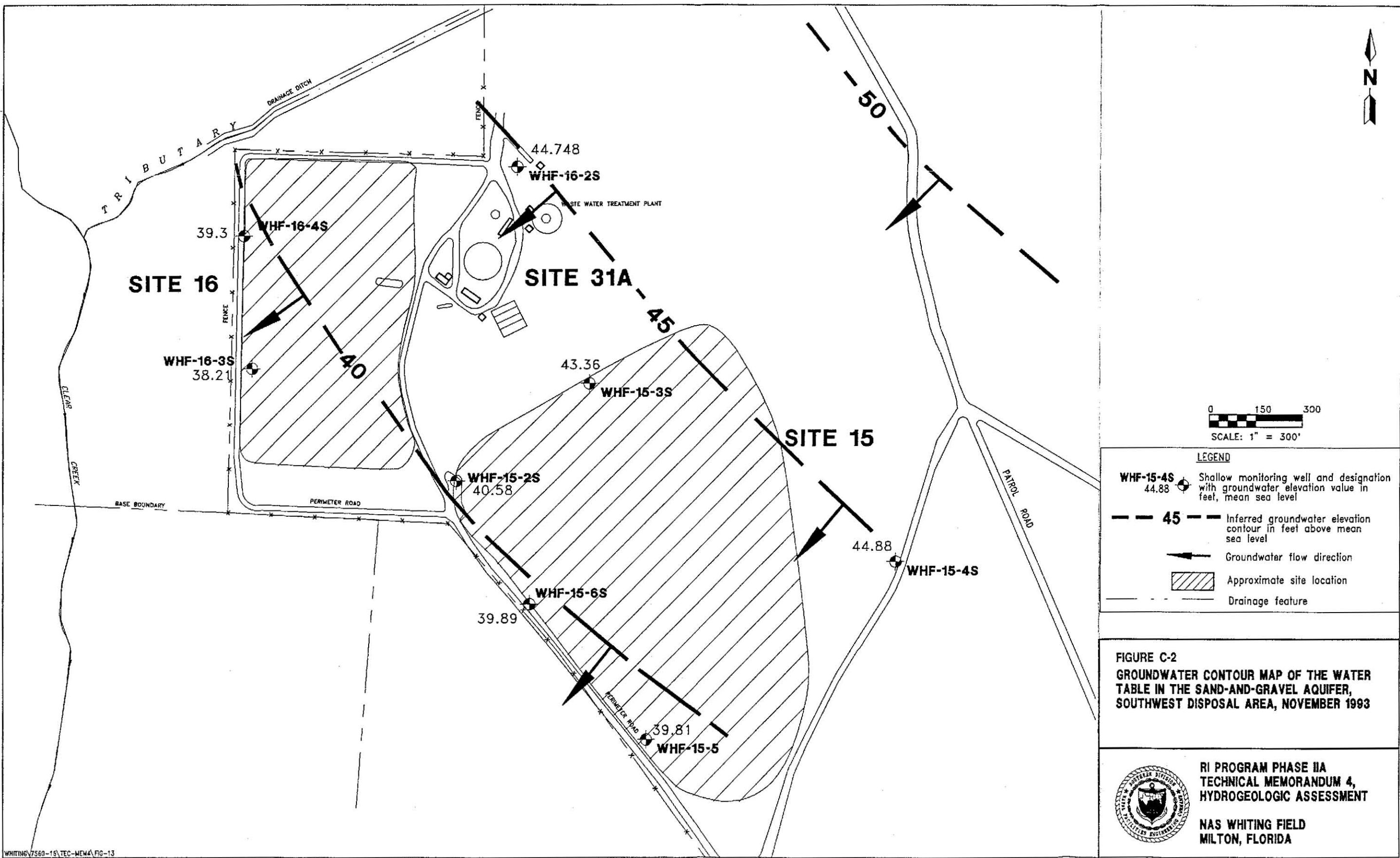
APPENDIX C

**GROUNDWATER COUNTOUR MAPS,
FIRST EVENT OF WATER LEVEL ELEVATION MEASUREMENTS**



RI PROGRAM PHASE IIIA
TECHNICAL MEMORANDUM 4,
HYDROGEOLOGIC ASSESSMENT

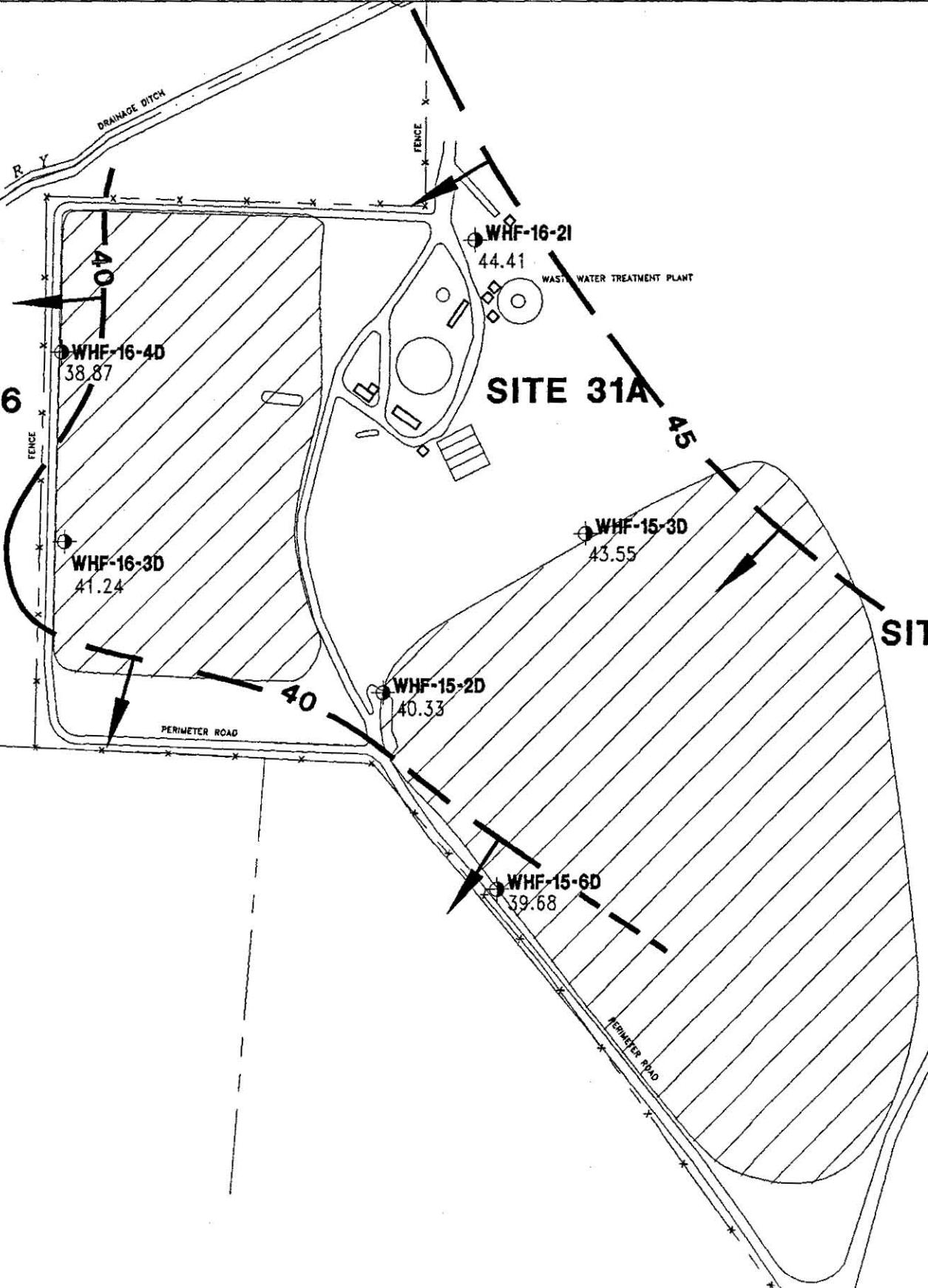
NAS WHITING FIELD
MILTON, FLORIDA



SITE 16

SITE 31A

SITE 15



0 150 300
SCALE: 1" = 300'

LEGEND

- WHF-15-3D 43.55 — Deep monitoring well and designation with groundwater elevation value in feet, mean sea level
- 45 — Inferred groundwater elevation contour in feet above mean sea level
- Groundwater flow direction
- Approximate site location
- Drainage feature

FIGURE C-3
GROUNDWATER CONTOUR MAP OF THE DEEP ZONE IN THE SAND-AND-GRAVEL AQUIFER, SOUTHWEST DISPOSAL AREA, NOVEMBER 1993



**RI PROGRAM PHASE II A
TECHNICAL MEMORANDUM 4,
HYDROGEOLOGIC ASSESSMENT**

**NAS WHITING FIELD
MILTON, FLORIDA**

